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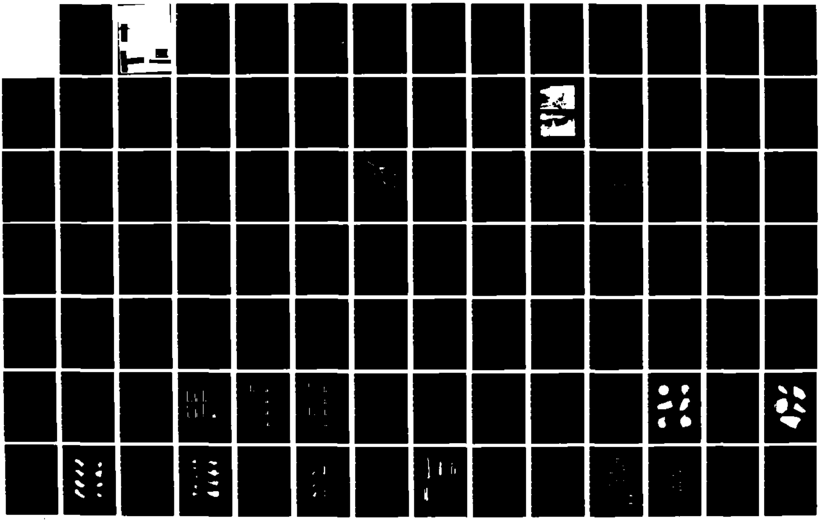

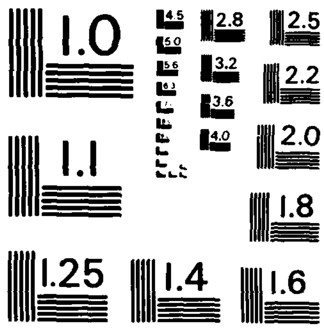
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ABSTRACT

Sites 45-DO-242 and 45-DO-243 are on the south bank of the Columbia River (RM 579), on either side of a steep draw draining a massive escarpment of colluvial terraces. Located in the Upper Sonoran life zone, they lay on a narrow alluvial fan about 2 m above the river prior to dam construction. The University of Washington excavated 174 m^3 at 45-DO-242 and 85 m^3 at 45-DO-243 in 1979 for the U.S. Army Corps of Engineers, Seattle District, as part of a mitigation program associated with adding 10 ft to the operating level behind Chief Joseph Dam. Systematic unaligned random sampling with 1 x 1-m excavation units with 1 x 2 and 2 x 2-m cells disclosed at least four cultural occupations at both sites. Nine radiocarbon dates from 45-DO-242 place cultural activity from about 3500-200 B.P. A single radiocarbon date from 45-DO-243 dates the most recent occupation after about 1500 B.P. Projectile points from both sites indicate occupations prior to 4000 B.P. Most cultural activity, including a probable winter village at 45-DO-242, occurred in the Hudnut Phase (ca. 4000-2000 B.P.). Site assemblages are remarkably consistent, with diagnostic artifacts and tool types reflecting an emphasis on hunting, partially supplemented by gathering. The presence of a village site, dated at 3500 B.P. and located between earlier and later occupations characterized as hunting and gathering camps, documents shifting patterns of site use characteristic of at least the last 5,000 years in the Rufus Woods Lake project area.

ARCHAEOLOGICAL INVESTIGATIONS AT SITES 45-DO-242 and 45-DO-243, CHIEF JOSEPH DAM PROJECT, WASHINGTON

by

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with

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D.K. Grayson 1978-1981
M.E.W. Jaehnig 1981-1984
J.V. Jermann 1978-1981

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Office of Public Archaeology
Institute for Environmental Studies
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1984

ABSTRACT

Sites 45-DO-242 and 45-DO-243 are on the south bank of the Columbia River (RM 579), on either side of a steep draw draining a massive escarpment of colluvial terraces. Located in the Upper Sonoran life zone, they lay on a narrow alluvial fan about 2 m above the river prior to dam construction. The University of Washington excavated 174 m^3 at 45-DO-242 and 85 m^3 at 45-DO-243 in 1979 for the U.S. Army Corps of Engineers, Seattle District, as part of a mitigation program associated with adding 10 ft to the operating level behind Chief Joseph Dam. Systematic unaligned random sampling with 1 x 1-m excavation units with 1 x 2 and 2 x 2-m cells disclosed at least four cultural occupations at both sites. Nine radiocarbon dates from 45-DO-242 place cultural activity from about 3500-200 B.P. A single radiocarbon date from 45-DO-243 dates the most recent occupation after about 1500 B.P. Projectile points from both sites indicate occupations prior to 4000 B.P. Most cultural activity, including a probable winter village at 45-DO-242, occurred in the Hudnut Phase (ca. 4000-2000 B.P.). Site assemblages are remarkably consistent, with diagnostic artifacts and tool types reflecting an emphasis on hunting, partially supplemented by gathering. The presence of a village site, dated at 3500 B.P. and located between earlier and later occupations characterized as hunting and gathering camps, documents shifting patterns of site use characteristic of at least the last 5,000 years in the Rufus Woods Lake project area.

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PREFACE

The Chief Joseph Dam Cultural Resources Project (CJDCRP) has been sponsored by the Seattle District, U.S. Army Corps of Engineers (the Corps) in order to salvage and preserve the cultural resources imperiled by a 10 foot pool raise resulting from modifications to Chief Joseph Dam.

From Fall 1977 to Summer 1978, under contract to the Corps, the University of Washington, Office of Public Archaeology (OPA) undertook detailed reconnaissance and testing along the banks of Rufus Woods Lake in the Chief Joseph Dam project area (Contract No. DACW67-77-C-0099). The project area extends from Chief Joseph Dam at Columbia River Mile (RM) 545 upstream to RM 590, about seven miles below Grand Coulee Dam, and includes 2,015 hectares (4,979 acres) of land within the guide-taking lines for the expected pool raise. Twenty-nine cultural resource sites were identified during reconnaissance, bringing the total number of recorded prehistoric sites in the area to 279. Test excavations at 79 of these provided information about prehistoric cultural variability in this region upon which to base further resource management recommendations (Jermann et al. 1978; Leeds et al. 1981).

Only a short time was available for testing and mitigation before the planned pool raise. Therefore, in mid-December 1977, the Corps asked OPA to review the 27 sites tested to date and identify those worthy of immediate investigation. A priority list of six sites was compiled. The Corps, in consultation with the Washington State Historic Preservation Officer and the Advisory Council on Historic Preservation, established an interim Memorandum of Agreement under which full-scale excavations at those six sites could proceed. In August 1978, data recovery (Contract No. DACW67-78-C-0106) began at five of the six sites.

Concurrently, data from the 1977 and 1978 testing, as well as those from previous testing efforts (Osborne et al. 1952; Lyman 1975), were synthesized into a management plan recommending ways to minimize loss of significant resources. This document calls for excavations at 34 prehistoric habitation sites, including the six already selected (Jermann et al. 1978). The final Memorandum of Agreement includes 20 of these. Data recovery began in May 1979 and continued until late August 1980.

Full-scale excavation could be undertaken at only a limited number of sites. The testing program data allowed identification of sites in good condition that were directly threatened with inundation or severe erosion by the projected pool raise. To aid in selecting a representative sample of prehistoric habitation sites for excavation, site "components" defined during testing were characterized according to (1) probable age, (2) probable type of occupation, (3) general site topography, and (4) geographic location along the river (Jermann et al. 1978:Table 18). Sites were selected to attain as wide a

diversity as possible while keeping the total number of sites as low as possible.

The Project's investigations are documented in four report series. Reports describing archaeological reconnaissance and testing include (1) a management plan for cultural resources in the project area (Jermann et al. 1978), (2) a report of testing at 79 prehistoric habitation sites (Leeds et al. 1981), and (3) an inventory of data derived from testing. Series I of the mitigation reports includes (1) the project's research design (Campbell 1984d) and (2) a preliminary report (Jaehnig 1983b). Series II consists of 14 descriptive reports on prehistoric habitation sites excavated as part of the project (Campbell 1984b; Jaehnig 1983a, 1984a,b; Lohse 1984a-f; Miss 1984a-d), reports on prehistoric nonhabitation sites (Campbell 1984a) and burial relocation projects (Campbell 1984c), and a report on the survey and excavation of historic sites (Thomas et al. 1984). A summary of results is presented in Jaehnig and Campbell (1984).

This report is one of the Series II mitigation reports. Mitigation reports document the assumptions and contingencies under which data were collected, describe data collection and analysis, and organize and summarize data in a form useful to the widest possible archaeological audience.

ACKNOWLEDGEMENTS

This report is the result of the collaboration of many individuals and agencies. During the excavation and early reporting stages, Coprincipal Investigators were Drs. Robert C. Dunnell and Donald K. Grayson, both of the Department of Anthropology, University of Washington, and Dr. Jerry V. Jermann, Director of the Office of Public Archaeology, University of Washington. Dr. Manfred E.W. Jaehnig served as Project Supervisor during this stage of the work. Since the autumn of 1981, Dr. Jaehnig has served as Coprincipal Investigator with Dr. Dunnell.

Three Corps of Engineers staff members have made major contributions to the project. They are Dr. Steven F. Dice, Contracting Officer's Representative, and Corps archaeologists Lawr V. Salo and David A. Munsell. Both Mr. Munsell and Mr. Salo have worked to assure the success of the project from its initial organization through site selection, sampling, analysis, and report writing. Mr. Munsell provided guidance in the initial stages of the project and developed the strong ties with the Colville Confederated Tribes essential for the undertaking. Mr. Salo gave generously of his time to guide the project through data collection and analysis. In his review of each report, he exercises that rare skill, an ability to criticize constructively.

We have been fortunate in having the generous support and cooperation of the Colville Confederated Tribes throughout the entire length of project. The Tribes' Business Council and its History and Archaeology Office have been invaluable. We owe special thanks to Andy Joseph, former representative from the Nespelem District on the Business Council, and to Adeline Fredin, Tribal Historian and Director of the History and Archaeology Office. Mr. Joseph and the Business Council, and Mrs. Fredin, who acted as liaison between the Tribe and the project, did much to convince appropriate federal and state agencies of the necessity of the investigation. They helped secure land and services for the project's field facilities as well as helping establish a program which trained local people (including many tribal members) as field excavators and laboratory technicians. Beyond this, their hospitality has made our stay in the project area a most pleasant one. In return, conscious of how much gratitude we wish to convey in a few brief words, we extend our sincere thanks to all the members of the Colville Confederated Tribes who have supported our efforts, and to Mrs. Fredin and Mr. Joseph, in particular.

Both 45-DO-242 and 45-DO-243 are located on lands owned by the State of Washington, which we thank for granting us permission to excavate the sites.

As authors of this report, we take responsibility for its contents. What we have written here is only the final stage of a collaborative process which is analogous to the integrated community of people whose physical traces we

have studied. Some, by dint of hard labor and archaeological training, salvaged those traces from the earth; others processed and analyzed those traces; some manipulated the data and some wrote, edited and produced this report. Each is a member of the community essential to the life of the work we have done.

Jerry V. Jermann, Coprincipal Investigator during the field excavation and artifact analysis phase of the project, developed site excavation sampling designs that were used to select data from each site. The designs provided a uniform context for studying prehistoric subsistence-settlement patterns in the project area. Loraine Gross and Janice Freedman directed the excavations.

S. Neal Crozier did the initial data summary for the stratigraphic analysis; Susan Freiberg and Valerie Barber performed the chemical and mechanical sort analyses. Dorothy Sammons-Lohse compiled the data for feature analysis and zone definitions. The laboratory staff, headed by Karen Whitlesey, did the technological and functional artifact analysis. Janice Jaehnig did keypunching and John Chapman and Duncan Mitchell manipulated the computerized data.

The writing of the report itself is a cooperative effort. Dr. Ernest S. Lohse wrote Chapter 1, 3, and 6. As senior author, he also co-ordinated and integrated the contributions of the other authors. S. Neal Crozier and Sarah Campbell wrote Chapter 2; Stephanie Stephanie Livingston and R. Lee Lyman analyzed the faunal assemblage and wrote Chapter 4; Dorothy Sammons-Lohse analysed the feature assemblage and wrote Chapter 5.

Marc Hudson edited the text, Dawn Brislawn typed the text; they jointly co-ordinated production. Fred Clark drafted many of the working copy figures and Melodie Tune and Bob Radek drafted the final versions. Larry Bullis photographed the artifacts. Final production of camera-ready copies was accomplished by Charolette Beck, Natalie Cadoret, and Philippa Colley under the direction of Sarah Campbell.

1. INTRODUCTION

Sites 45-DO-242 and 45-DO-243 are on the left bank of the Columbia River about 100 meters and 150 meters, respectively, downstream from River Mile (RM) 579 in the SE1/4 of the SE1/4 of Section 36, T31N, R29E, Alameda Flat Quadrangle (U.T.M. Zone 11, N.5333500, E.343500) (Figure 1-1). A narrow, deep draw separates the two sites. Site 45-DO-242 lies to the east on a small, low terrace beneath a steep, talus-laden, north-facing slope that rises to a still higher, broader terrace. To the west on the same elongated terrace remnant, 45-DO-243 lies beneath another, steep, north-facing slope that rises to a higher terrace, where 45-DO-244 is located. The latter is a burial site excavated as part of the Corps of Engineer's burial relocation program (Contract DACW67-78-C-0106). Plate 1-1 is a view of 45-DO-242 to the east and Plate 1-2 is a view of 45-DO-243 to the northeast.

The three sites share an abrupt, steep drainage that plunges down from the terraces above the river. To the south, the land gains 200 m in elevation in less than 300 m (Figure 1-2). Once less than 2 m above the Columbia River, 45-DO-242 and 45-DO-243 now lie on narrow terraces partially inundated by Rufus Woods Lake. Aboriginally, the sites would have been most easily approached along the sandy banks of the river. The steep drainage channel would have provided a convenient route to the uplands to the south.

The site surfaces are now beaches, fringed with sparse stands of sage and grasses. Prior to inundation, sagebrush and bunch grasses grew on both sites. Ponderosa pines now grow within the drainage and beside it, as well as on the higher terraces. A sagebrush-grass association (<u>Artemisia tridentata-Agropyron</u>) (Daubenmire 1970), typical of the Upper Sonoran life zone (Piper 1906), characterizes the vegetation in the site area. Introduced plants include cheatgrass (<u>Bromus tectorum</u>), Russian thistle (<u>Salsola kali</u>), and thistle (<u>Cirsium</u> spp.) among others. Scattered sagebrush and rabbit brush (<u>Chrysothamnus nauseosus</u>), and a dense understory of grasses along with an abundance of spring flowers grow on the site. A more mesic association including rose (<u>Rosa</u> sp.), serviceberry (<u>Amelanchier</u> sp.), horsetail (<u>Equisetum</u> ssp.), tule (<u>Scirpus acutus</u>), and sedges (<u>Carex</u> spp.) grows in nearby drainages.

On the upper terraces above the river, <u>Artemisia rigida</u> replaces big sagebrush in areas of thinner, rocky soils. Bitterbrush (<u>Purshia tridentata</u>) and isolated pines (<u>Pinus ponderosa</u>), with an understory of grasses, grow along the steep draws draining the slopes and terraces. To the south, across the river, scattered pines give way to sagebrush covered uplands dotted with small lakes and springs. To the north, mixed Douglas fir (<u>Pseudotsuga menziesii</u>) and pine are dominant in moister bottomlands and along streams,

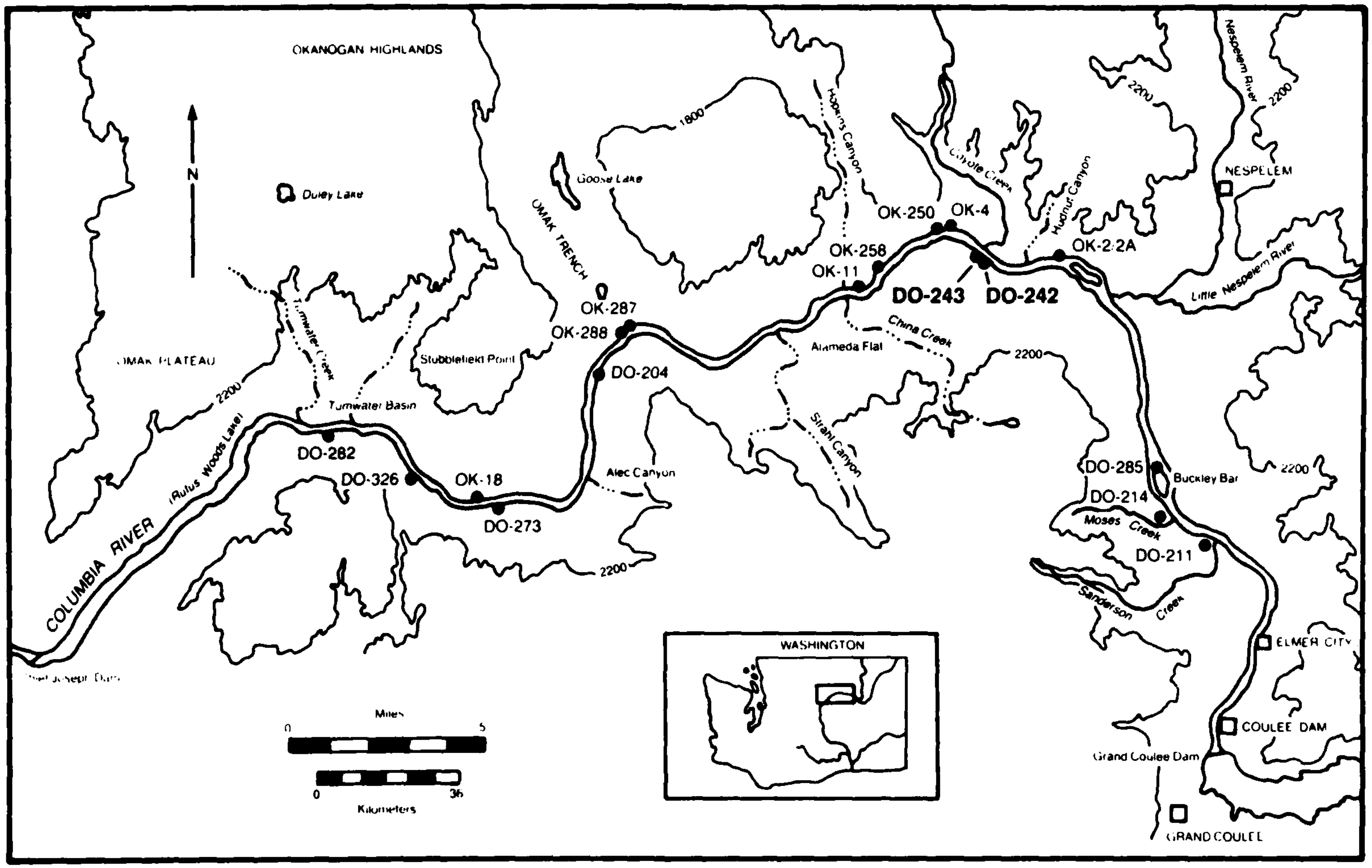


Figure 1-1. Plan map of project area showing location of 45-DO-242 and 45-DO-243.

Plate 1-1. View to the east (upriver), 45-DO-242.

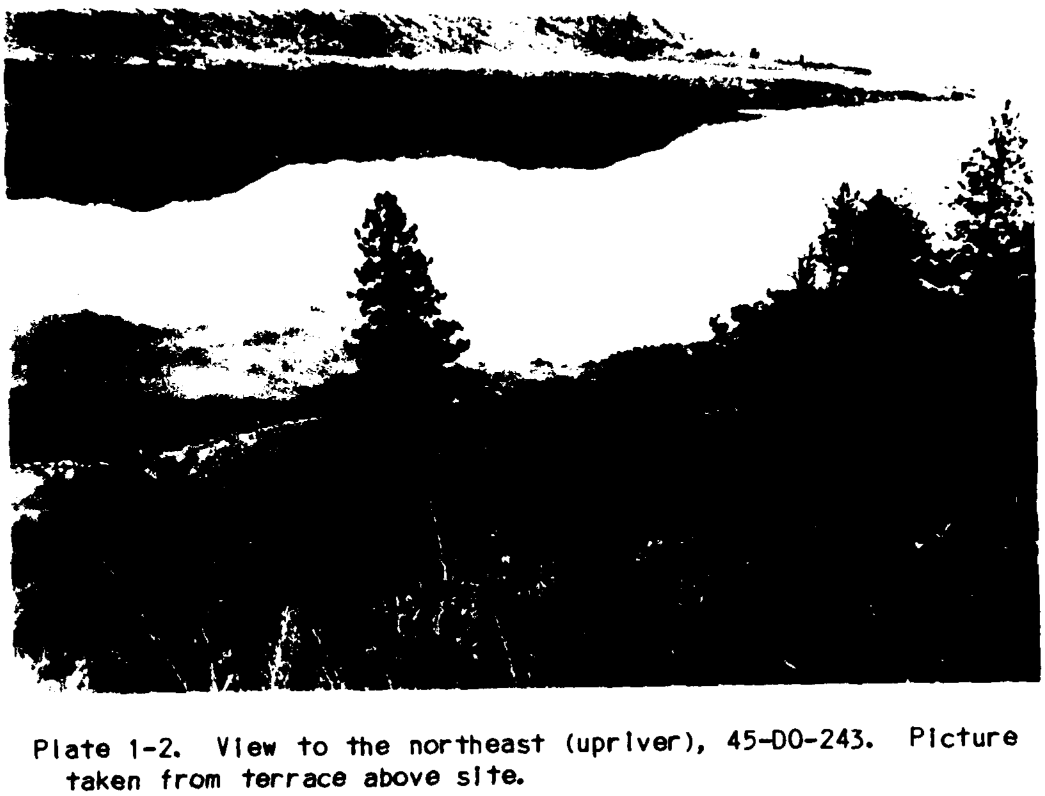


Plate 1-2. View to the northeast (upriver), 45-DO-243. Picture taken from terrace above site.

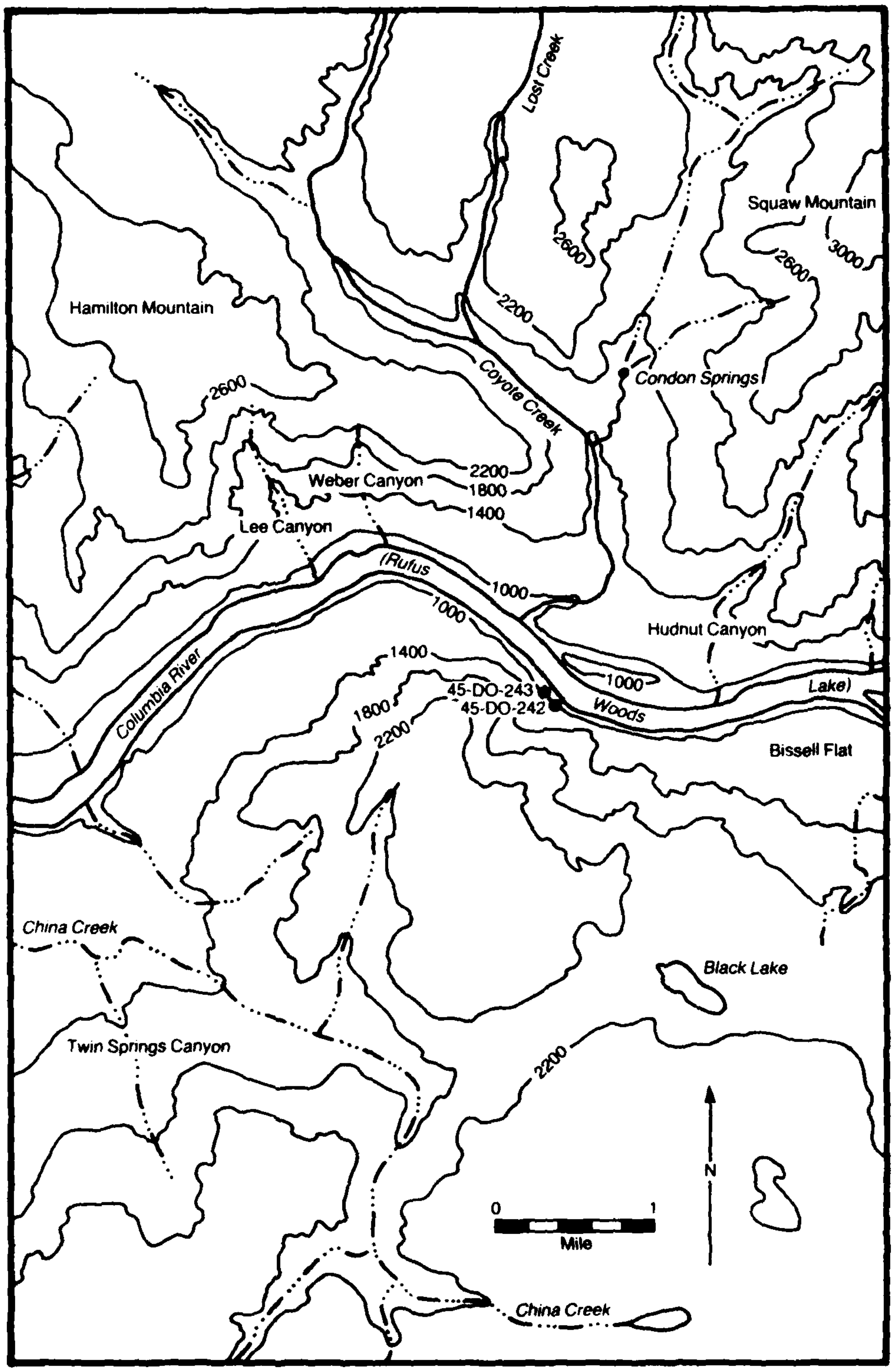


Figure 1-2. Map of site vicinity, 45-DO-242 and 45-DO-243.

where they grow with broadleaf trees and shrubs. At the highest elevations, the fir forest gives way to pine forest, except on north-facing slopes and valley floors, where the dominant species is still Douglas fir with larch (Larix occidentalis) and some spruce (Picea engelmannii) and an associated understory of woody shrubs.

45-DO-242 and 45-DO-243 are favorably located. The site inhabitants would have had a dependable water source and easy access to the Plateau uplands. They could exploit a wide variety of game and wild plants. Seeds and roots could be gathered from spring through fall. Large game species like elk and deer ranged between upland and river. Smaller species were restricted in range to specific vegetation communities and water sources. Migratory waterfowl were plentiful along rivers, streams and lake margins during the spring and fall. The river yielded suckers and freshwater mussels, as well as salmon during spring, summer, and fall runs. Site inhabitants could have exploited any of these species, scheduling their visits or activities to coincide with the availability of specific resources. These sites also might have served as more permanent bases where people lived for much of the year, travelling out to hunt and gather food stuffs.

INVESTIGATIONS AT 45-DO-242 AND 45-DO-243

Site 45-DO-242 was excavated during the 1979 field season, with work beginning on 16 May 1979 and ending on 14 August 1979. It was selected for investigation because testing in the spring of 1978 had yielded evidence of at least three cultural occupations. Thus the site promised to shed light on changing cultural patterns of prehistoric peoples in the project area. The retrieval of a radiocarbon date of 738±67 B.P. (TX-3131) from the uppermost cultural occupation generated yet more interest. As this date placed the site in Rufus Woods Lake Period VI (1500-250 B.P.), a period not well represented in prior testing and excavation assemblages, 45-DO-242 was immediately placed on the priority list for excavation.

Site 45-DO-243 also was excavated during the 1979 field season, with work beginning on 28 June 1979 and ending on 24 August 1979. This site was selected because testing in the spring of 1978 had yielded evidence of at least two cultural occupations. Two small projectile points classified as Rabbit Island Stemmed were recovered from the more recent occupation, which was therefore assigned to RWL IV (3500-2500 B.P.). The apparent age of the site's cultural deposits and its potential for yielding a wide range of habitation features argued for more intensive investigation.

Because they were separated by a deep draw and differed in cultural stratigraphy, the two sites were excavated separately. 45-DO-242 held a greater range and number of cultural features than 45-DO-243. Available dates revealed a gap of almost two thousand years between the abandonment of 45-DO-243 and the latest occupation of 45-DO-242.

Excavation of 45-DO-242 was conducted within a stratified unaligned systematic random sampling design (Figure 1-3). Individual sampling strata consisted of contiguous sets of 25 2 x 2-m grid units arranged in square quadrat arrays. These excavation units were randomly selected within each 10

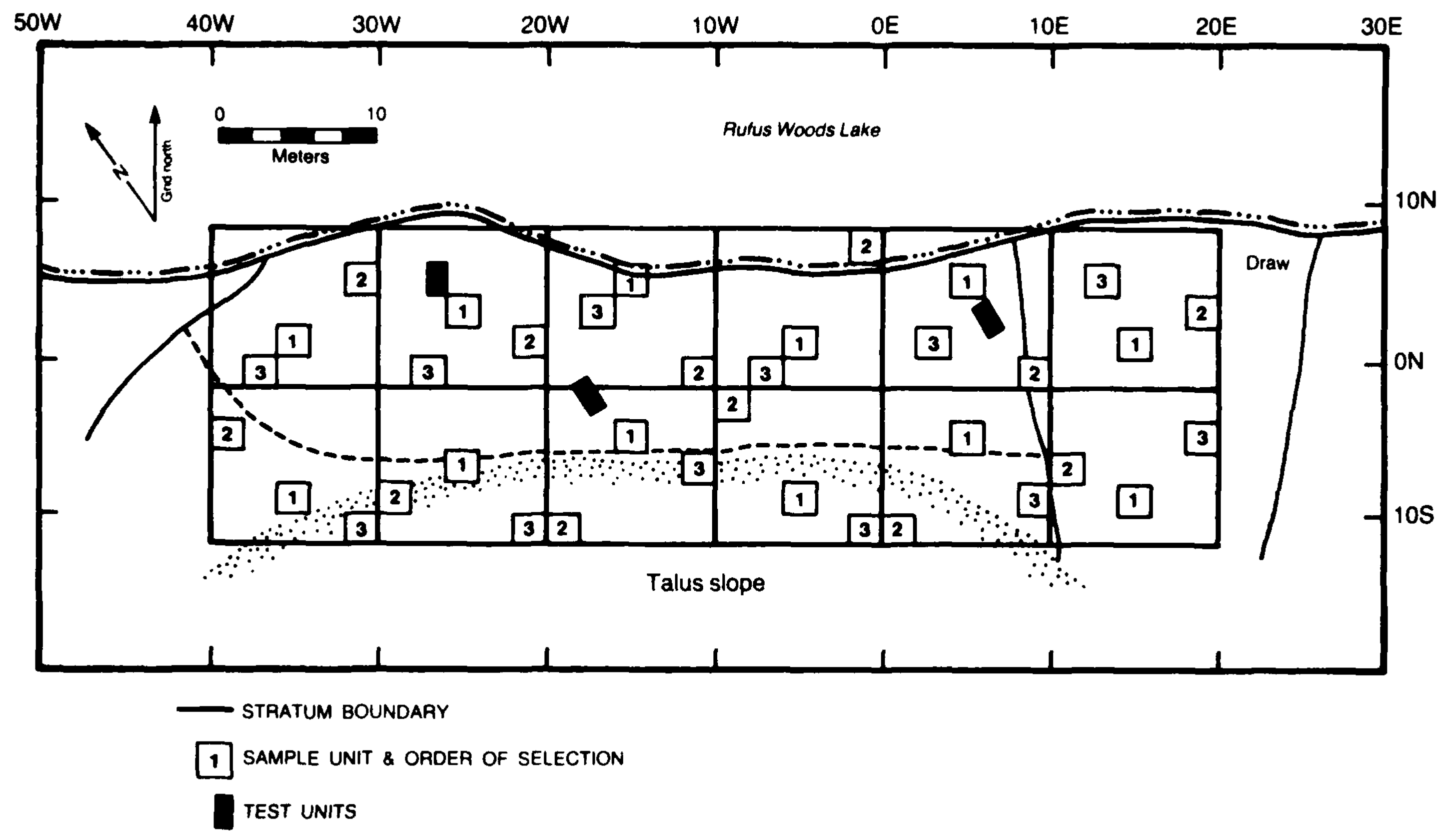


Figure 1-3. Sampling plan, 45-DO-242.

x 10-m stratum. The sampling process was designed to determine the range of cultural features at the site and thereby enable the excavators to assess the need for purposively placed units.

Two different unit sizes were used. Along the southern part of the site, as a consequence of sparse deposits at the toe of the talus slope, a smaller, 1 x 1-m unit was excavated in each sampling stratum (Figure 1-4). Both 1 x 1-m and 2 x 2-m excavation units were used over most of the site area. Except at the extreme northeast end of the site, at least two units were excavated for each sampling stratum. With the discovery of two housepits in the northern part of the site, purposive units were introduced to insure a more complete excavation of these features. For the western housepit, the three probabilistic units in the stratum were connected with purposive units to expose the living floor more fully. A similar strategy was used for the eastern housepit. Excavators also dug a single 1 x 1-m unit in the center of a large pit feature in the approximate center of the site. In all, they dug 31 units, covering an area of 80 m^2, and producing a total excavated volume of about 128 m^3.

Excavation at 45-DO-243 also was conducted within a stratified unaligned systematic random sampling design, wherein sampling strata were to consist of contiguous sets of 25 2 x 2-m grid units placed in square quadrat arrays (Figure 1-5). Field conditions, however, required that this ideal design be modified. It was discovered that 23 of the proposed 48 sample units were either located in rocky, non-site terrain or were situated too close to the rising water of the reservoir. For the purposes of the excavation design, these units were considered excavated, and without cultural deposits. The other units were dug (Figure 1-6). Purposive excavation units were not added since the site had few cultural features and low densities of artifacts. A total of 25 1 x 2-m units were dug, covering an area of 50 square meters, and producing a volume of about 85 m^3.

Excavation at 45-DO-242 exposed 28 cultural features spread out through four distinct cultural zones: three pit houses, seven open firepits, eight other pits, four bone concentrations, four lithic concentrations and two shell concentrations. Six radiocarbon dates document occupations from at least 3900 to 200 B.P. The artifact assemblage is large and varied, totalling 7,272 lithic artifacts, 58,429 whole and fragmented pieces of bone, 5,928 pieces of shell, and 2,253 fire-modified rocks. Among the artifacts are 520 worn and manufactured objects encompassing a broad range of lithic and nonlithic tools.

Excavation at 45-DO-243 exposed seven cultural features occurring throughout four cultural zones: a possible pit house, a roasting pit, an open firepit and four shell concentations. A single radiocarbon date from an upper zone suggests at least one occupation at about 1500 B.P. Excavators recovered 2,557 lithic artifacts, 6,494 whole and fragmented pieces of bone, 1,322 pieces of shell and 29 fire-modified rocks. Of the lithic artifacts, 138 were worn and manufactured. The artifact assemblage was much less varied than that of 45-DO-242.

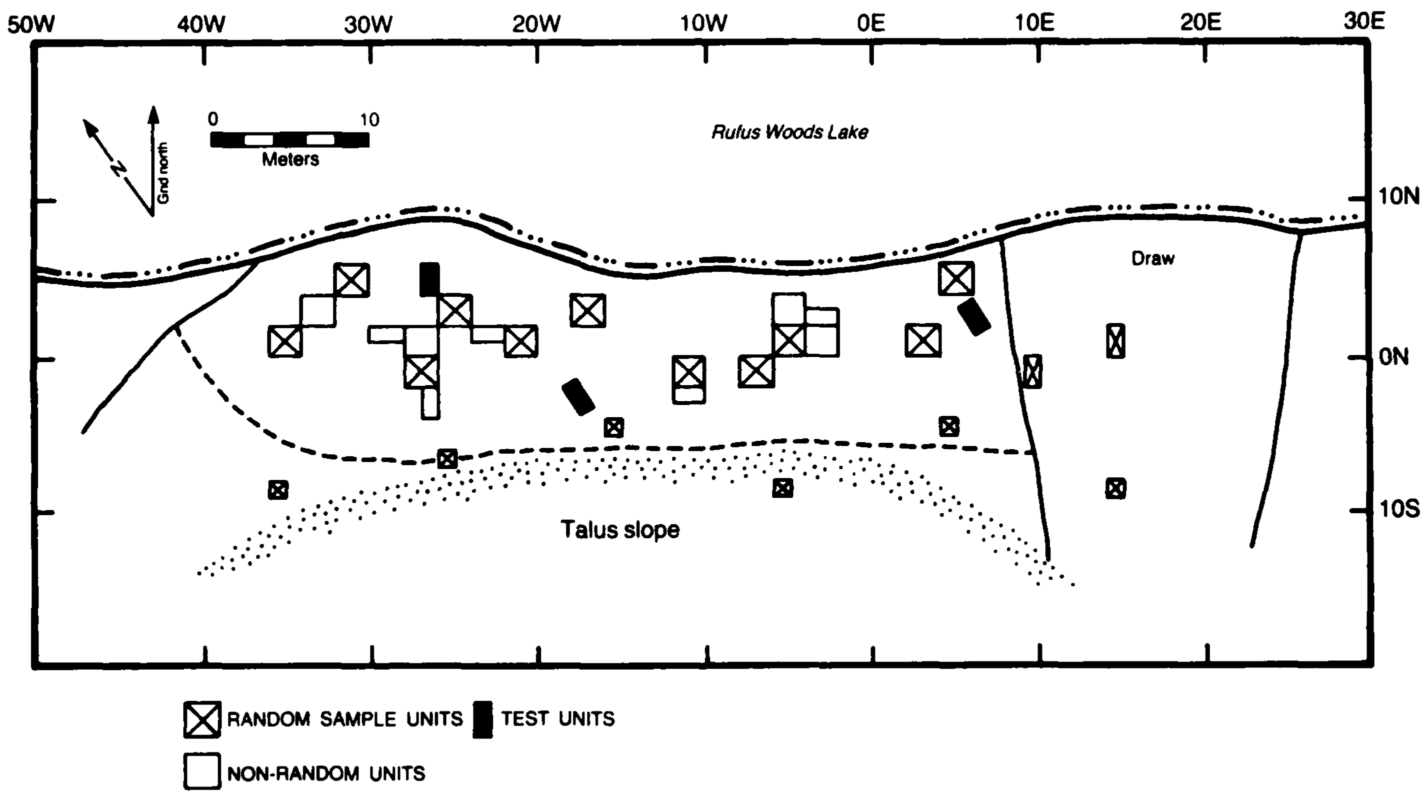


Figure 1-4. Excavated units, 45-DO-242.

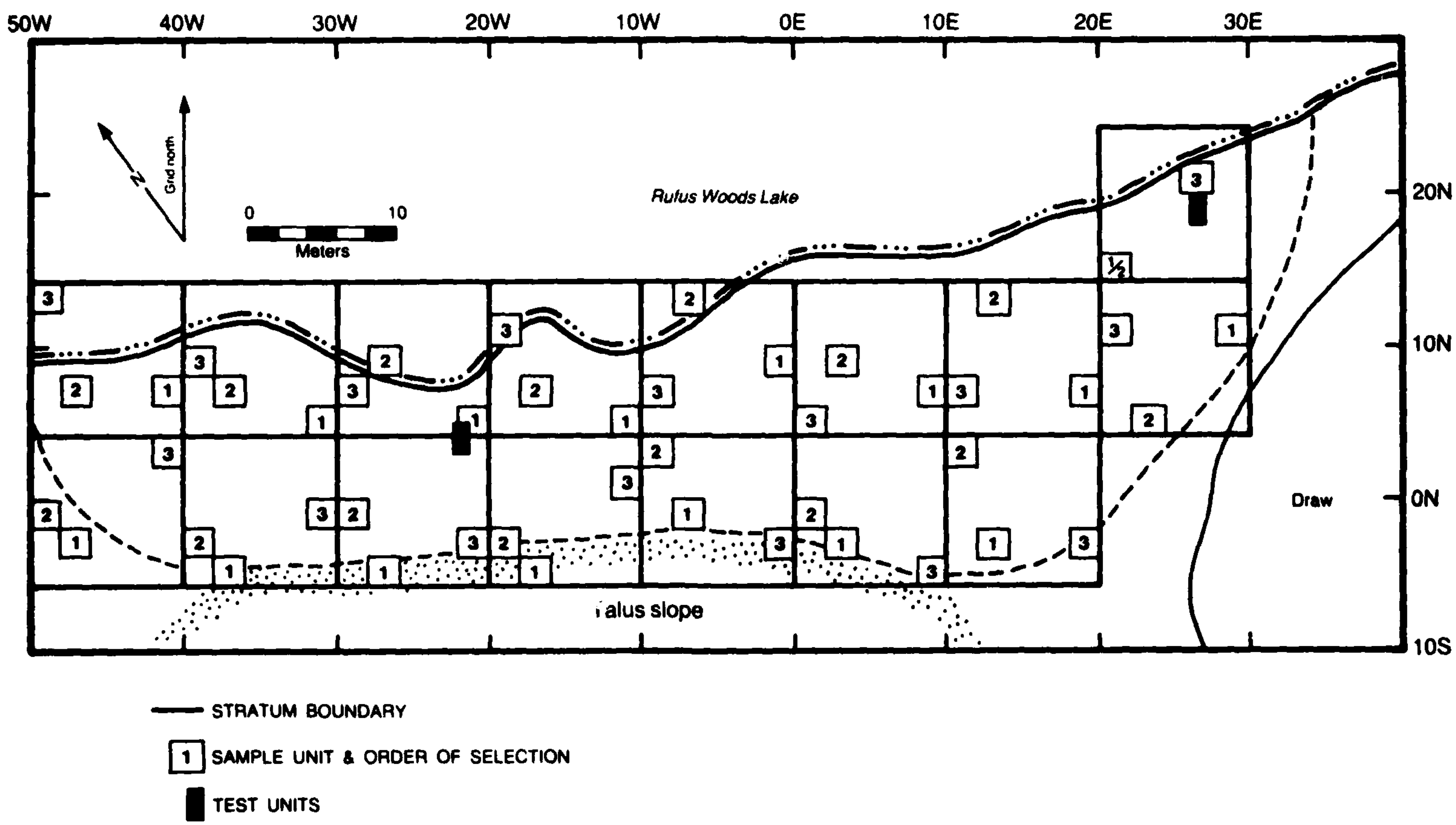


Figure 1-5. Sampling plan, 45-DO-243.

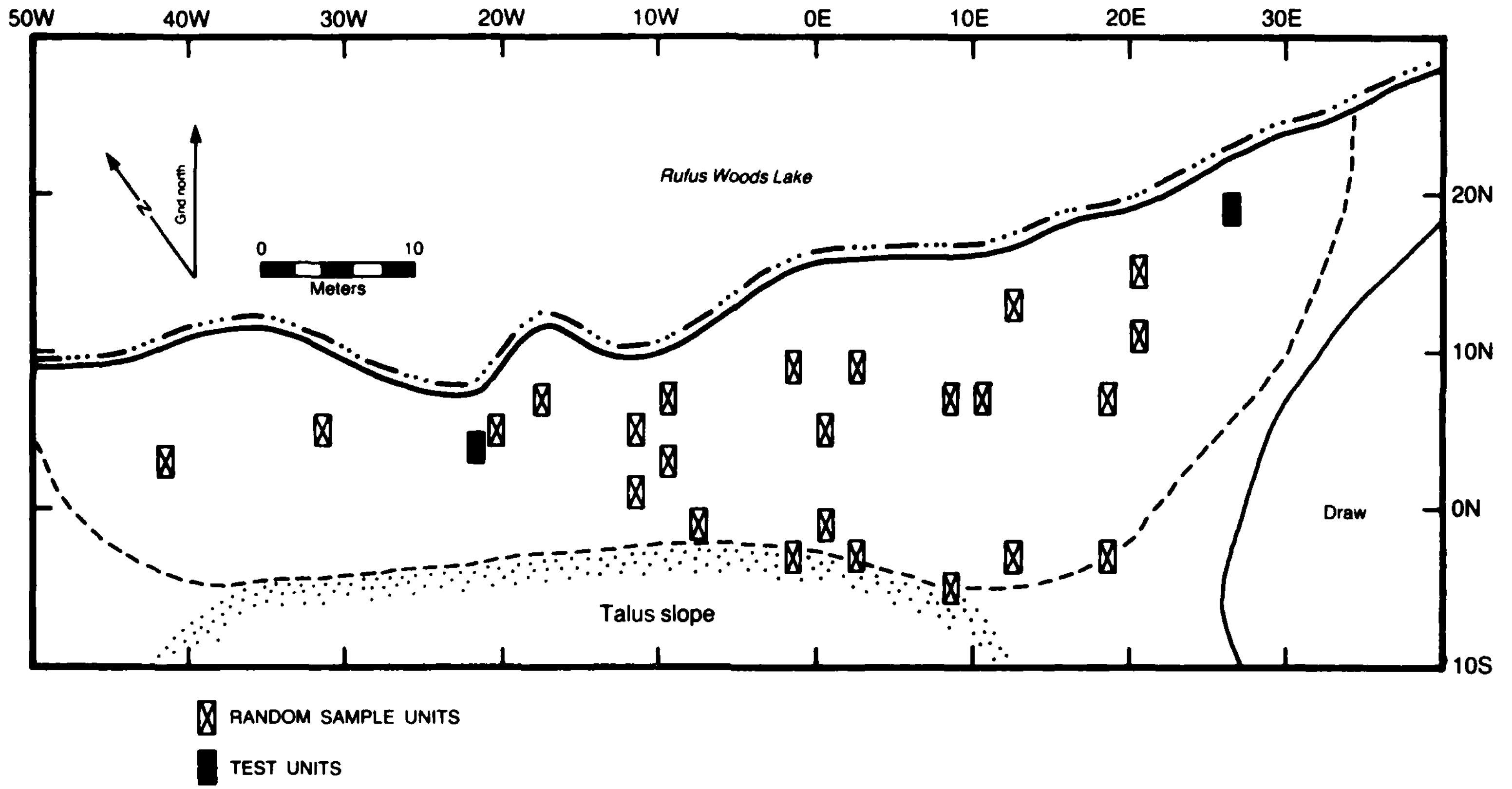


Figure 1-6. Excavated units, 45-DO-243.

REPORT FORMAT

The following chapters present the results of investigations at 45-DO-242 and 45-DO-243. Owing to their physical proximity and the fact that the same research procedures were applied to each site, they are discussed together. Chapter 2, Natural and Cultural Stratigraphy, describes the geologic setting of the two sites, defines the basic depositional units, and relates these to cultural units or analytic zones. Chapter 3, Artifact Analyse, gives the results of the three kinds of analyses--technological, functional and stylistic--that were applied to the artifacts. Chapter 4, Faunal Analysis, describes the faunal remains recovered from the sites; discusses their meaning in terms of subsistence patterns of the sites' occupants; and makes inferences from the remains about the seasonality of occupations at the sites. Chapter 5, Features Analysis, describes the artifact associations and physical boundaries defined in the field as cultural features. Chapter 6, Synthesis, summarizes the sites' cultural deposits; makes inferences from them concerning the nature and chronology of their occupations; and then places these findings in the context of the region's previous archaeology.

2. NATURAL AND CULTURAL STRATIGRAPHY

This section discusses the geologic setting of sites 45-DO-242 and 45-DO-243 with reference to local geologic history and describes the sedimentary history of the sites themselves in detail. Strata mapped during excavation are grouped into sitewide depositional units, which provide the basis for determining how deposition occurred and for correlating cultural materials among units. The second half of the chapter discusses the cultural strata or analytic zones defined within this framework.

GEOLOGIC SETTING

Sites 45-DO-242 and 45-DO-243 are in the upper canyon of the project area. Here, the Columbia River flows along the eastern margin of the Waterville Plateau where the Columbia River Basalts contact the granitic rocks of the Colville Batholith. It is believed the river has flowed along the margin of the Plateau since the late Miocene outpouring of basalts. During the Pleistocene the middle and northern reaches of the Columbia River drainage were overlain by ice sheets. The Okanogan Lobe of the Cordilleran ice sheet entirely filled the upper canyon to the Grand Coulee, reaching its maximum extent between 13,000 and 14,500 B.P. The ice wasted away earlier in the upper canyon than in the lower canyon. As a consequence, river waters ponded behind the ice dam, and the upper canyon was filled with a thick profile of glaciolacustrine sediments. When the ice dam in the lower canyon was finally breached, the Columbia River rapidly downcut through the lacustrine sediments with occasional stillstands, creating a deep, narrow valley with a prominent terrace system. Mazama tephra Layer O has been observed in alluvial fans built on to the 1000 ft terrace (Hibbert 1984), indicating that the river reached this elevation before 7000 B.P., and probably reached historic elevations shortly thereafter.

The rapid, postglacial downcutting of the Columbia River left a deep canyon characterized by a well-developed terrace system and narrow channel, occurring entirely in bedrock. Depositional and erosional processes responsible for altering the landscape since this time include lateral migration, point bar, and overbank deposition of the Columbia River, alluvial fan development, colluvial deposition, and aeolian deposition. Little floodplain development has taken place in this narrow valley, but natural levees and abandoned channels can be recognized in some areas. Surfaces less than 20 m above the historic river levels commonly exhibit overbank deposits. While this stretch of the river is characterized by comparatively little meandering, local lateral migrations are recorded by the shape of the river,

point bar formation, and erosional episodes in site profiles. Alluvial fans have been built on the terraces at the mouths of tributary canyons. Few permanent drainages occur in the project area: most drainage is intermittent and unintegrated. Talus slopes are common at the base of both granitic and basaltic bedrock formations. Erosion and colluvial redeposition of the thick glaciolacustrine sediments in the upper canyon is common. This may take the form of major landslides or small deposits. Aeolian deposits cover the surface of all but the youngest landforms.

Sites 45-DO-242 and 45-DO-243 are located at the river margin of an alluvial fan at the base of a shallow draw upstream from River Mile 579. The terrace system created by postglacial downcutting through glaciolacustrine sediments is apparent on the opposite side of the river and downstream, where terraces cut into Nespelem silt are capped by Columbia River gravels. In the immediate vicinity of the site, however, the glaciolacustrine sediments have been eroded down to the present river level, revealing outcrops of the granitic rocks of the Colville Batholith. Although there is no prominent, gravel-capped terrace mapped in the site area, the basal deposit found in our excavations is Columbia River gravels, consisting of rounded basaltic and granitic cobbles, pebbles, and gravel. Ephemeral streams draining the slopes above the site have deposited alluvium on this surface: the surficial deposit mapped in the site area is alluvial fan and mud slide deposits (Figure 2-1).

Fans are generally fan-shaped in plan view and best described morphologically as a segment of a cone radiating away from a single point source. This fan, however, is not particularly well developed because the adjacent basin was subject to river fluctuations. Field observations indicate that it is actually a series of micro-alluvial fans which have coalesced. Each fan would have grown at different rates, depending on ephemeral stream water discharge and sediment load. It is quite common for adjacent fans to merge at their lateral extremities; the individual cone shape is lost, and a rather nondescript deposit is formed. These coalesced fans are commonly referred to as bajadas, alluvial aprons, or alluvial slopes (Ritter 1982:278). Due to bank erosion in historic times, it is impossible to determine whether the fans were ever cone-shaped or always apron-shaped as they are today. What is apparent is that by 4,000 or 5,000 years B.P. the heavy precipitation that cut the stream draws had lessened and the fan became stable enough for human occupation. The fan has been cut and narrowed by the rising of the Columbia River after the construction of Chief Joseph Dam.

PROCEDURES

In 1979, from June through August, the stratigraphic crew mapped 165 linear meters from 27 excavated units at 45-DO-242. A minimum of two walls was mapped in each 1 x 1-m and 1 x 2-m unit and all four walls were mapped in each 2 x 2-m unit. In addition, 16 m of the river bank were profiled. Four excavation units were selected for column sediment sampling. They were chosen from spatially representative areas that exhibited a major portion of the cultural and natural depositional sequences (Figure 2-2).

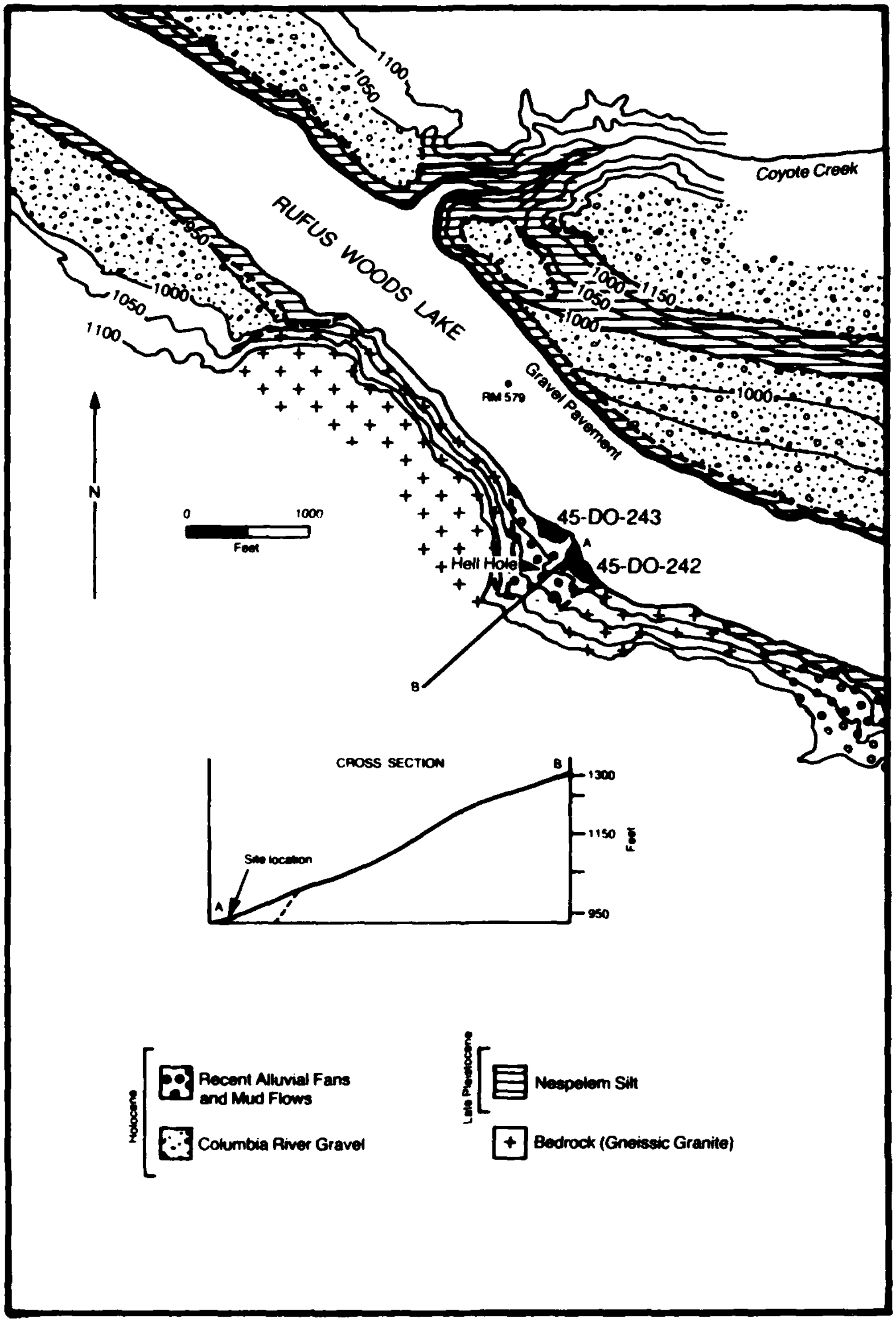


Figure 2-1. Geologic map of site vicinity, 45-DO-242 and 45-DO-243.

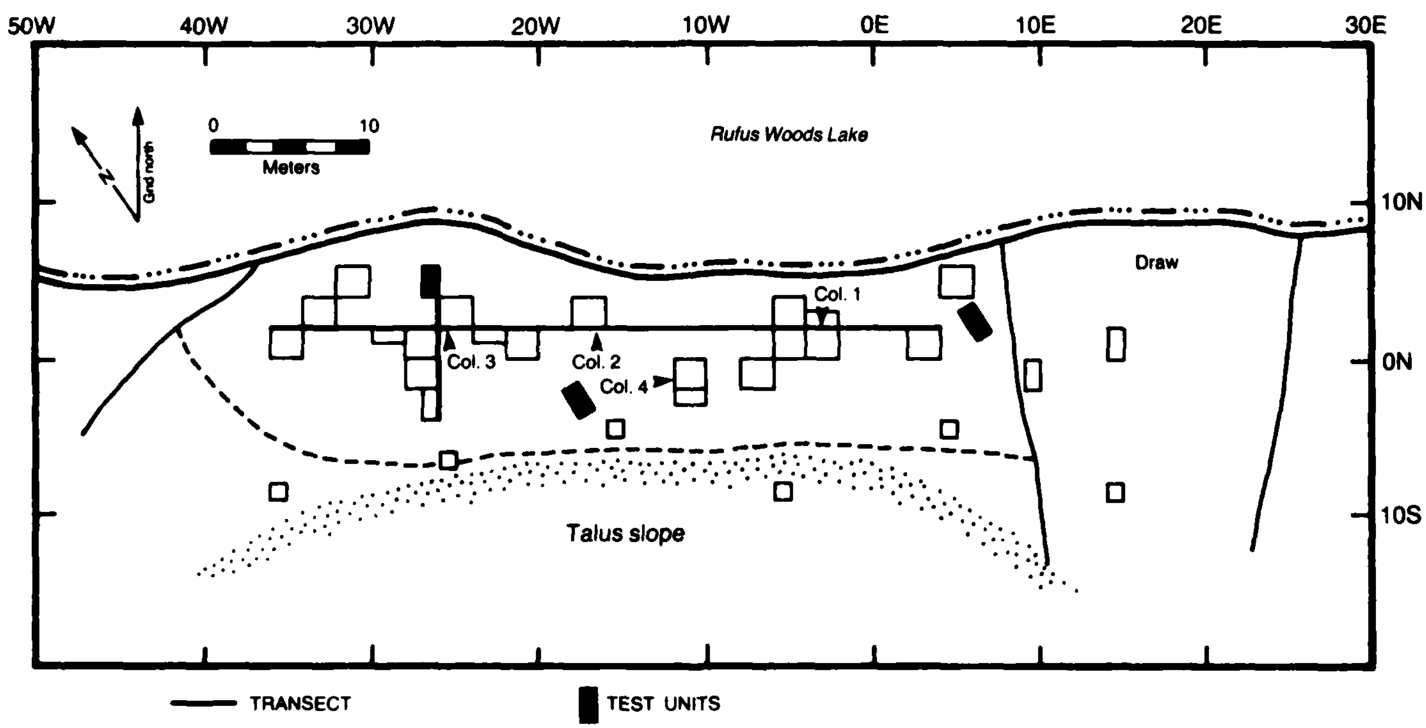


Figure 2-2. Location of column samples and transects, 45-DO-242.

Seventy-five linear meters of profiles, including at least two walls from every excavation unit were drawn at 45-DO-243 September 1979. Figure 2-3 shows the location of the three units selected for column sampling.

Wall collapse created problems for stratigraphic profiling. The unconsolidated alluvial sands over the cobble layer proved unstable when they dried after exposure. The overlying strata collapsed along several meters of wall before profiling was completed. However, at least two walls from every unit were available for profile recording.

The stratigraphic crew examined the deeply cut stream banks which border 45-DO-242 to east and west, and 45-DO-243 to the east. Deposits of an unidentified tephra as well as shell were observed in the bank, particularly to site grid east. Shovel test holes on the terrace above the site revealed a tephra deposit of 30 cm to 60 cm in thickness but no additional shell or other cultural material was uncovered.

Based upon study of field profile descriptions and physical and chemical analyses, we have grouped the strata mapped during excavation into sitewide depositional units. We have used the stratigraphic boundaries as temporal markers to aid us in subdividing the cultural deposits for analyses. The horizontal and vertical distribution of artifacts by quad and level was compared with the natural depositional sequence and feature boundaries. Those stratigraphic units containing a discrete cultural deposit were defined as analytic zones. Radiocarbon dates and diagnostic feature types were used to check our determinations. Additional information on the methods and procedures used in stratigraphic analysis and definition of zones can be found in the project's research design (Campbell 1984d).

DEPOSITIONAL HISTORY

Although different numbers of sitewide strata could be distinguished at 45-DO-242 (7) and at 45-DO-243 (12), it was possible to relate them to a sequence of three depositional units which apply to both sites. Morphological descriptions of each stratum can be found in Tables 2-1 and 2-2. Stratigraphic transects across 45-DO-242 are shown in Figure 2-4, and a more detailed east-west profile in Figure 2-5. Figure 2-6 presents stratigraphic transects across 45-DO-243.

DU I -- Lower Bar Deposit

The oldest deposit encountered is the river-rounded basal sediment of coarse sand material with gravel, pebbles and cobbles. The deposit delineates the southern meander of the river in this area which occurred prior to occupation. Stratigraphic evidence suggests that the river boundary reached the southern slope before the alluvial fan began forming. As the stratigraphic transects (Figure 2-4 and 2-6) show, the topography of the basal gravel and cobble layer differs from that of the present surface.

The laminated bands of sand and silt-sized sediments found within and overlying the pebbles and cobbles are viewed as a result of the same depositional episode. In structure, size and composition these sediments are

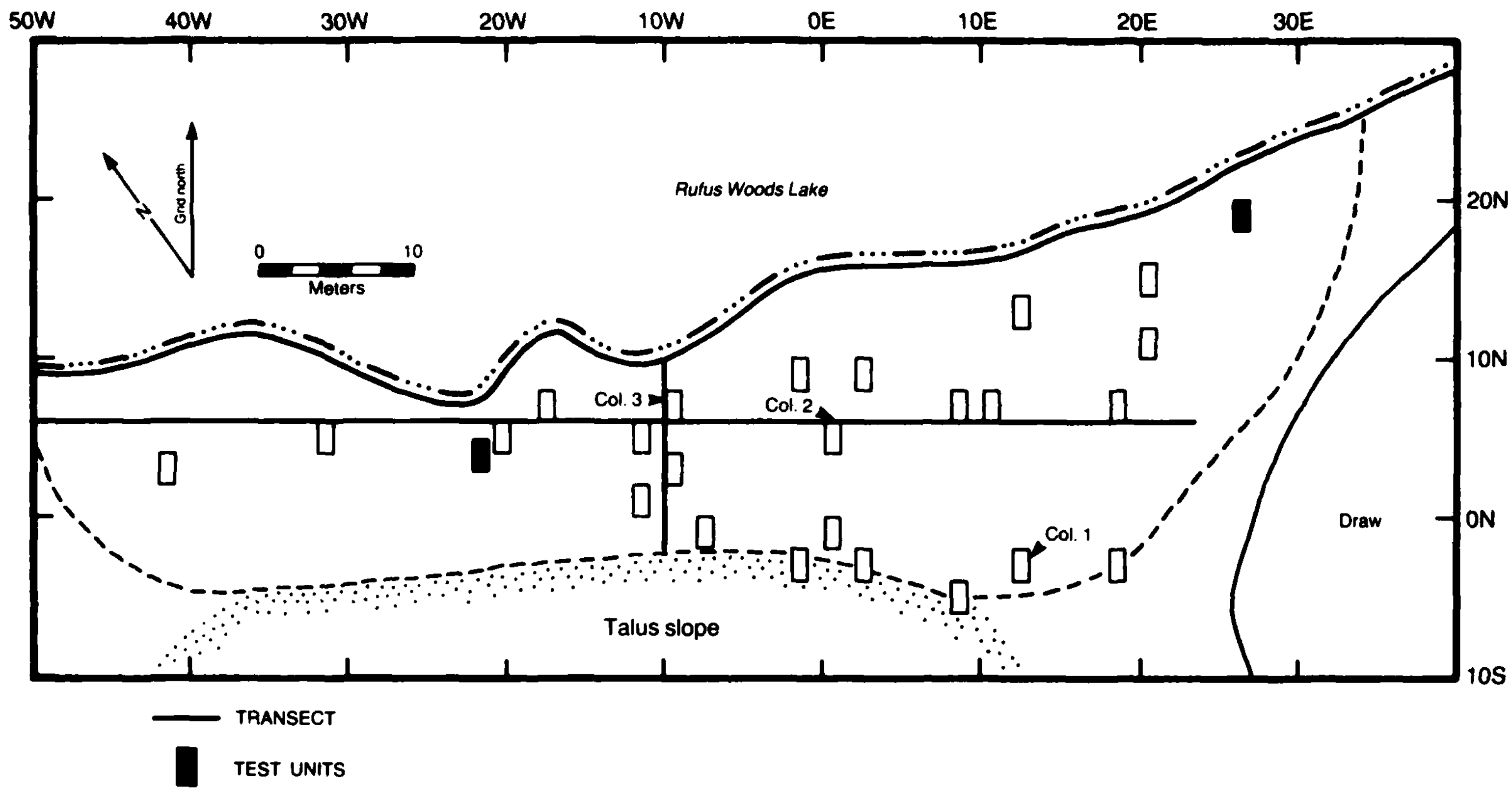


Figure 2-3. Location of column samples and transects, 45-DO-243.

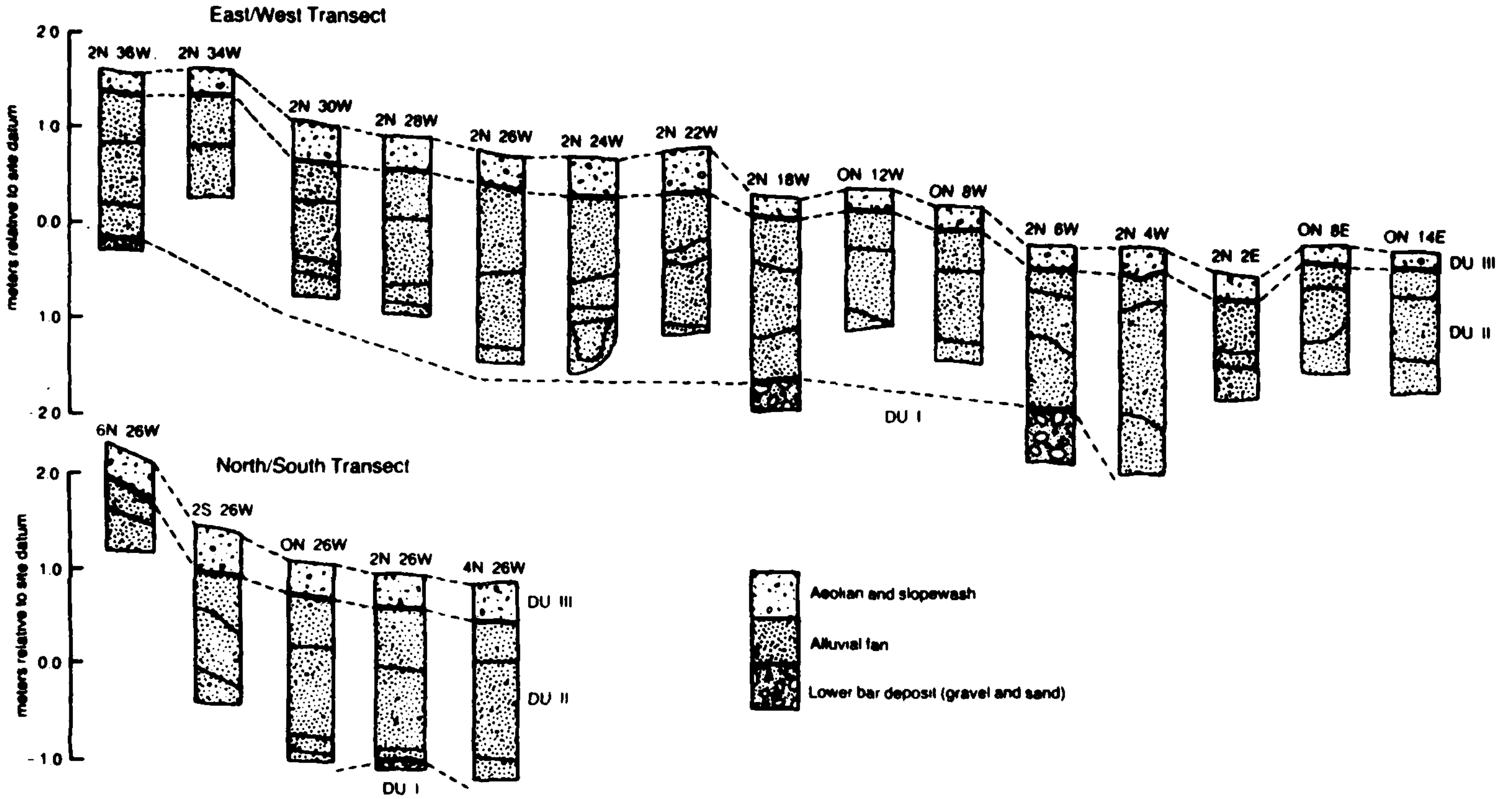


Figure 2-4. Stratigraphic transects, 45-DO-242.

Field Stratum	Grouped Strata	DESCRIPTION
A	100	Brown (10YR5/3) sandy loam, coarse blocky structure, soft consistence, moderately to poorly sorted. Grasses, twigs, roots. Boundary clear/wavy.
I	100	Greyish brown (10YR5/2) loamy sand, blocky structure, soft consistence, poorly sorted. Roots, occasional fine gravel. Boundary clear/wavy.
II	100	Light grey (10YR7/2) fine to medium sand, medium blocky structure, soft consistence, moderately well sorted. More compact than Stratum I. Boundary abrupt, irregular/broken, very disturbed.
III	100	Broken (10YR5/3) fine to medium sand, medium blocky structure, soft consistence, moderately sorted. Shell, charcoal, roots, occasional fine to coarse gravel. Boundary gradual/wavy.
IV	200	Brown (10YR5/3) slightly lighter than Stratum III, fine to medium sand, medium blocky structure, soft consistence, moderately sorted. Shell, bone charcoal, occasional coarse gravel, and pebbles. Boundary gradual/wavy.
V/VI	400	Pale brown (10YR6/3) medium sand, fine blocky structure, soft consistence, moderately well sorted. Occasional fine to coarse gravel, charcoal. Boundary wavy/diffuse to clear.
VIII	600	Very pale brown (10YR7/4) fine to medium sand, coarse blocky structure, hard consistence, weakly cemented, moderately well sorted. Abundant medium and coarse gravel and pebbles. Boundary clear/wavy.
X	600	Pale brown (10YR6/3) coarse and medium sand, slightly hard consistence, very weakly cemented, moderately well sorted. Occasional fine to coarse gravel. Boundary clear to gradual/wavy.
XI	700	Salt and pepper sand, coarse and medium. Single grain structure, loose consistence, moderately well sorted. Some medium and coarse gravel. Boundary unknown.

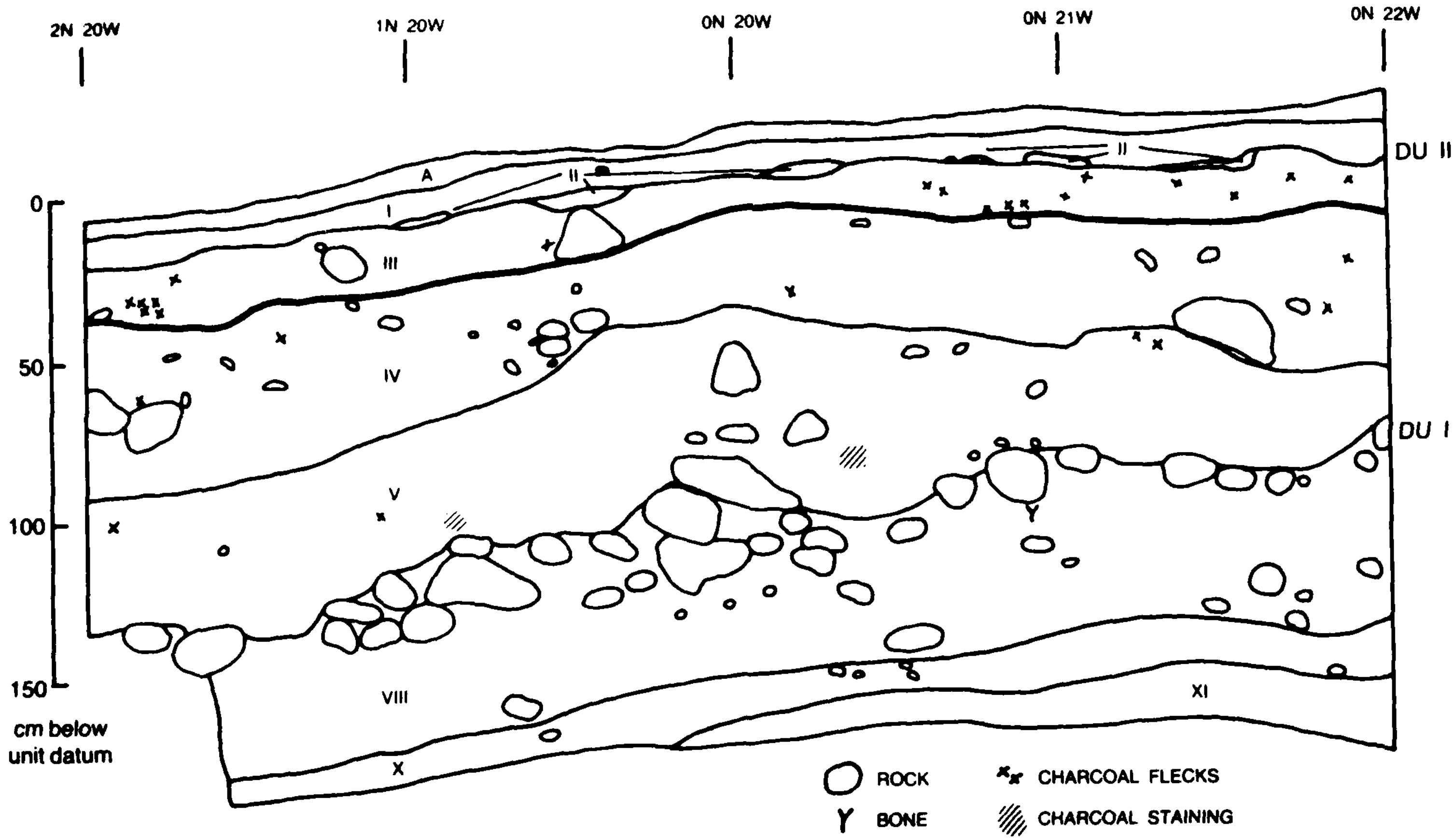


Figure 2-5. Detailed profile at 2N, 45-DO-242.

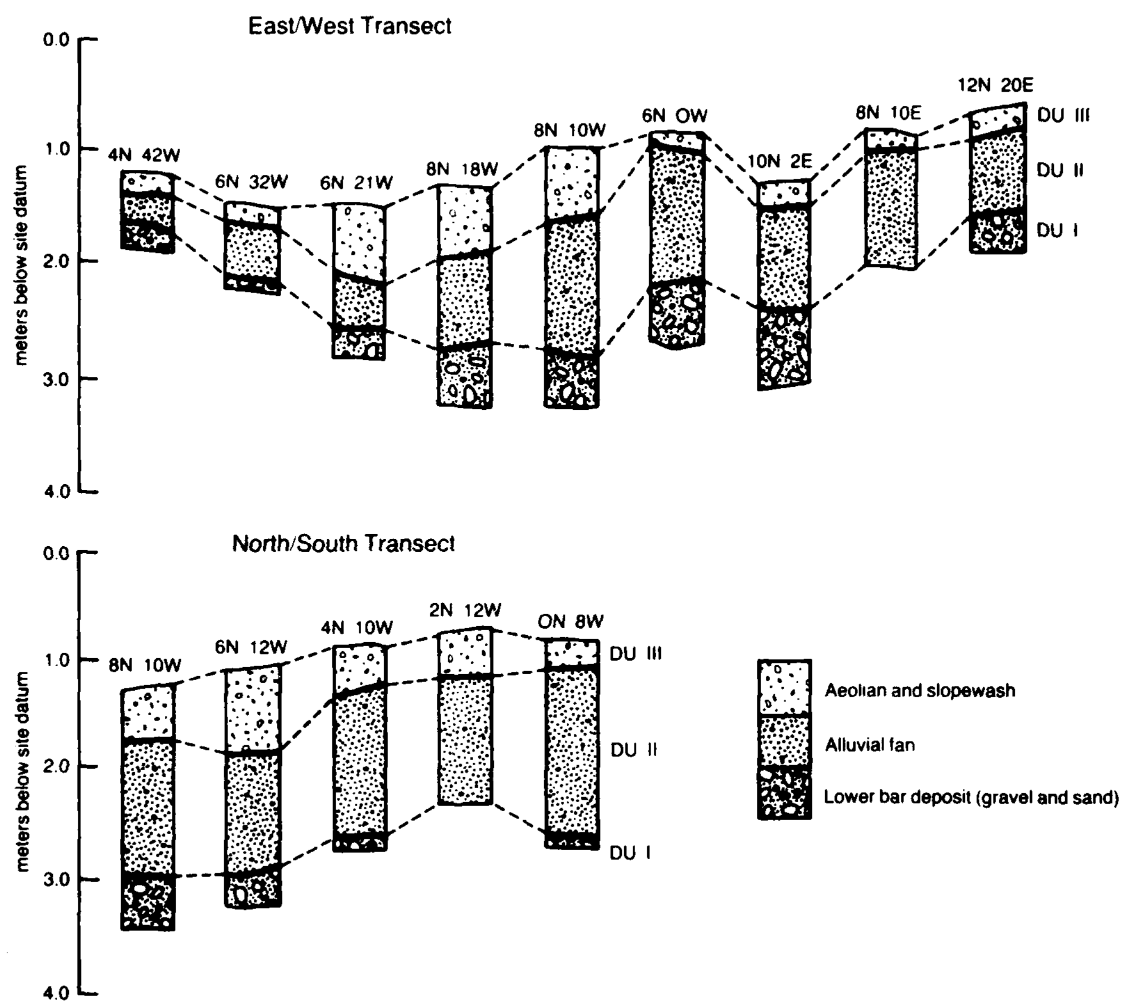


Figure 2-6. Stratigraphic transects, 45-DO-243.

Table 2-1. Morphological descriptions of combined strata at 45-DO-242.

DU[1]	Stratum	Color		Texture	Consistence	pH	Comments
		Moist	Dry				
III	100	Brown (10YR 5/3)	Pale brown (10YR 6/3)	Loamy sand to sandy loam	Loose (moist)	6.1-7.4	Consists of surface organic litter mat. Predominantly aeolian material. Poorly sorted. Contains scattered evidence of latest occupation. Blocky structure near surface, medium granular at base. Angular/subangular gravel and pebble-sized sediments. Boundary: clear to gradual, smooth.
II	200	Brown (10YR 5/3)	Light yellowish brown (10YR 6/4)	Sand to loamy sand	Firm (moist)	6.6-8.0	Increase in slope wash and alluvial fan sediments. Poorly sorted, medium to fine granular structure. More cultural debris. Subangular to subrounded grains. Boundary: clear to gradual, smooth to wavy.
	300	Pale brown (10YR 6/3)	Pale brown (10YR 6/3)	Sand to loamy sand	Soft (dry)	7.0-8.0	Not a sitewide stratum, similar to 400. Moderately well sorted, fine blocky structure. Mixed slope wash and alluvial fan material. Subangular to subrounded grains. Boundary: diffuse, smooth.
	400	Pale brown (10YR 6/3)	Grayish brown (10YR 5/2)	Loamy sand	Soft (dry)	7.0-8.5	Alluvial fan material. Moderately well sorted with some fine, subangular gravel. Blocky structure high in cultural debris. Boundary: abrupt to clear, smooth to irregular.
	500	Brown (10YR 5/3)	Pale brown (10YR 6/3)	Loamy sand	Firm (moist)	7.5-8.5	Alluvial fan sediments altered by heavy cultural activity. Not sitewide cultural evidence. Similar attributes to grains in stratum 400. Boundary: abrupt, wavy to irregular.
	600	Pale brown (10YR 6/3)	Very pale brown (10YR 7/4)	Sand to loamy sand	Slightly hard, weakly cemented	7.4-7.8	Predominantly slope wash, alluvium and colluvium. Mixture of angular to subrounded grains with gravel, pebbles and cobbles. Boundary: clear, wavy.
I	700	Pale brown (10YR 6/3) (predominantly salt and pepper)	Very pale brown (10YR 7/4)	Sand to loamy sand	Soft/loose (dry)	6.7-8.0	Basal river channel deposit with rounded to subrounded grains and gravel, pebbles and cobbles. Unconsolidated single grain structure.

[1] Depositional unit

Table 2-2. Morphological descriptions of combined strata at site 45-DO-243.

DU[1]	Stratum	Color: Moist	Color: Dry	Texture	Consistence	pH	Comments
III	100	Brown to pale brown (10YR 5/3-6/3)	Brown to yellowish brown (10YR 5/3-6/4)	Loamy sand	Soft (dry)	6.7-7.4	Consists of surface litter mat and wind-modified alluvium. Boundary: abrupt to gradual, smooth.
	110	Brown to pale (10YR 5/3-6/3)	Brown to light yellowish brown (10YR 5/3-6/4)	Loamy sand	Soft (dry)	7.2	Wind-modified alluvium. Some depositional unit as 100 but considerably less vegetal disturbance. Boundary: abrupt, smooth.
II	135	Pale brown (10YR 6/3)	Light yellowish brown (10YR 6/4)	Loamy sand	Soft (dry)	7.0	Ephemeral stream deposit of angular gravel and pebbles. Predominantly granitics. Boundary: abrupt, wavy.
	150	Pale brown (10YR 6/3)	Pale brown to light yellowish brown (10YR 6/3-6/4)	Loamy sand to sandy loam	Firm (moist)	7.1-7.2	Wind-modified alluvial fan material. No cultural evidence. Boundary: Clear, smooth.
	175	Pale brown to light yellowish brown (10YR 6/3.5)		Loamy sand to sandy loam	Loose to firm (moist)	7.2-7.4	Wind-modified alluvial fan material. Same depositional unit as level 150 with absence of cultural disturbance and an increase of coarser fan debris.
	285	Pale brown (10YR 6/3)		Loamy sand	Soft (dry)	7.4	Alluvial fan material, less aeolian and an increase in angular-subangular gravel. Boundary: Clear to gradual, wavy.
	300	Light brownish gray to pale brown (10YR 6/2-6/3)	Pale brown to light yellowish brown (10YR 6/3-6/4)	Loamy sand	Loose to firm (moist)	6.8-7.5	Banded sand and gravel. Slope wash deposit. Boundary: abrupt, wavy.
	301	Light brownish gray to pale brown (10YR 6/2-6/3)	Pale brown (10YR 6/3)	Loamy sand to sandy loam	Firm (moist)	7.5-7.8	Probably associated with slope wash deposit level 300. Boundary: Clear, smooth.
I	305	Pale brown (10YR 6/3)	Pale brown (10YR 6/3)	Loamy sand	Firm (moist)	6.7	Silty band mixed with sand. Deposited by retreating water. Boundary: Abrupt, broken.
	310	Pale brown (10YR 6/3)	Light yellowish brown (10YR 6/4)	Sand	Loose to firm (moist)	7.5-7.8	Very similar to level 325 which overlies cobbles, but appears to contain more alluvial fan material near surface of level.
	325	Light gray to very pale brown (10YR 6.5/3-7/2.5)		Sand to loamy sand	Soft-loose (dry)	6.95-7.3	Some slope wash material but predominantly river deposited sand associated with underlying cobble level. This level is very similar to and difficult to distinguish from level 310.
	330	Light brownish gray to pale brown (10YR 6/2-6/3)	Light yellowish brown (10YR 6/4)	Loamy sand	Firm (moist)	6.8-7.1	Silty matrix. Could be overbank deposit associated with underlying cobble level.

[1] Depositional unit

very similar to those found in the present river-deposited beach samples just north of the site. Together, these graded beds of variable, fining upwards texture represent lateral accretion by the Columbia River as it built an alluvial bar.

DU II -- Alluvial Fan

At each site, next oldest depositional unit is alluvial fan material. The two fans have separate sources, small draws to the south. Identification of the deposits as alluvial fans is based on the shape of the deposit; which is thickest away from the river; the decrease in particle size away from the draw; and the microscopic identification of the grains as sub-angular to sub-rounded. The source of the larger sub-angular particles is undoubtedly the granitic rocks in the slope south of the site; grains of quartz and orthoclase feldspar, the dominant constituents of these rocks, are more common than in the underlying Columbia River deposits.

However, there are significant differences in the deposits at the two sites which indicate that they comprise two distinct fans with different depositional regimes. The fan at 45-DO-242 is thicker and accumulated more rapidly. Gravel, pebbles, and cobbles occur in the lowest fan strata at 45-DO-243, indicating greater stream competence. Some of the strata are massive and contain sufficient silt-sized material to have a blocky structure. These may be mud slides rather than strictly alluvial deposits. In fact, much of the sediment in both fans is probably colluvial rather than directly water transported. Water run-off was apparently confined to the bordering large streams.

The volume of run-off at 45-DO-243 was apparently less. There, small multiple branching channels formed a distributary network. The network moved sand, gravel and, in some cases, pebble-sized sediments but lacked the energy to transport this material as far as the river. Individual beds are thinner and less continuous than at 45-DO-243. The remains of small channels are apparent in profiles.

DU III -- Slope Wash and Aeolian Sediments

The upper unit contains a mixture of surface organic litter material, aeolian deposits and some slope wash sediments. Unlike DU II, the principal transport mechanism is aeolian rather than alluvial. Angular to sub-angular quartz grains compose a loamy sand. No overbank or slack water sediments were encountered at 45-DO-242; the silt band in a small depression (Unit 4N-26W) was interpreted as slope wash material rather than an overbank deposit.

PHYSICAL AND CHEMICAL ANALYSES OF COLUMN SAMPLES

The seven units selected for column sampling, four from 45-DO-242 and three from 45-DO-243, were all from areas with some cultural material. The physical constraints of both sites, i.e., the eastern and western draws, the southern slope, and the Columbia River to grid north, prohibited the sampling

of a completely non-cultural off-site column. However, excavation unit 2S-12E at 45-DO-243 (Column #1) contained a minimal amount of habitation debris and was selected for the "off-site" control unit. A capsule interpretation of the column sample analytical results follows, based on data shown in Tables A-3 through A-7, Appendix A.

By determining the smoothness or roughness of sediment grains, and the degree of their rounding, one can deduce the environment of their deposition and the mode of their transport. The postulated aeolian grains were angular to sub-angular, pitted, and sandy-loam to loamy sand in size classification. The predominantly alluvial fan sediments exhibited non-pitted, sub-angular to sub-rounded, grains with an increase in the sand-sized fraction. The basal river-deposited sediments were clean, glossy, rounded to sub-rounded, sand-sized grains. These differences in grain properties were observed in all columns and were used to define depositional boundaries. Microscopic and chemical analyses indicated some cultural peaks that were not in evidence on profile walls.

Using Column #1 samples as the non-disturbed control standard, site 45-DO-243 column samples were analyzed. Overall, they indicated low intensity occupation. The pattern of pH variation with depth--shift from slightly acidic in the upper strata to slightly alkaline at the lower depths--is the typical pH profile in the project region. Cultural debris tends to increase the alkalinity of the soil yet further as evidenced in the results from Columns 2 and 3. The slim increase in pH results from Samples 17 and 23 of Column I is a common occurrence in the lower depths at both sites and is attributed to the slightly alkaline reaction of buried alluvium-colluvium deposits with increasing amounts of $CaCO_3$. Because of its position this area received more slope and sheet wash from the southern slope and organic materials extended deeper in this unit.

Column #2 at 45-DO-243 was selected for sampling because the profile walls revealed heavy cultural disturbance of the natural deposition. Charcoal, carbon staining, bone, shell and organic material were at the highest levels of any unit sampled at the site. Particle size determinations, percentages of minerals, and grain rounding offer evidence of a culturally disturbed, wind-modified alluvial deposit overlying river-rounded alluvium. The angular to sub-angular grains of Samples 5 and 6 indicate ephemeral stream and slope wash deposits while the rounded to sub-rounded grains are common in river deposited alluvium (Samples 15 and 20). The lower peak in calcium ppm (Samples 16 to 19) parallels the results from the control Column #1 and the two upper peaks (Samples 3 to 6 and 8 to 12) closely match the microscopic analysis results which indicate cultural activity at those levels.

Column #3 is from a unit representative of the deposits in the mid-western sector of the site; the profile exemplified a combination of the depositional characteristics of both Column 1 and Column 2. Grain morphological features, particularly the grain rounding determinations, indicate a thorough mixing of aeolian, slope wash and alluvial material. Because of the extensive grain mixing, it is difficult to separate the underlying river-deposited alluvium from the wind-modified alluvial fan material. This difficulty is compounded by the fact excavation never reached

the rounded cobble level. The lack of cultural evidence on the profile walls is generally confirmed in the analytical results. Most of the samples lack organic remains. Phosphorous and pH tests show none of the peaks usually associated with cultural activity. In Samples 13 through 17, however, the high calcium percentages were not explained by any cultural evidence on the walls. Microscopic analysis did uncover traces of shell: it is possible that slope wash or alluvial fan debris carried calcium deposits from southern and south-eastern cultural layers to this unit.

The column samples from 45-DO-242 also reveal cultural evidence not observed on profile walls. This is particularly noticeable in Column #2 (Unit 4N-18W). Under the microscope, charcoal was observed that was not recorded on profile drawings. Chemical analysis also bears out the presence of cultural activity in levels that were thought to be sterile. Similarly, Column #4 samples revealed more cultural material in the upper half of the unit than could be discerned in the field.

Unit 4N-26W, where Column 3 was taken, had some of the heaviest concentrations of cultural material observed on any profile walls at the site. Differences in the physical and chemical analytical results of these samples and those of the "off-site" column samples indicate the extent to which human activity can alter the chemistry and composition of samples.

CULTURAL ANALYTIC ZONES, 45-DO-242

Four separate cultural episodes corresponding to natural stratigraphic divisions were defined as cultural analytic zones at 45-DO-242. Table 2-3 summarizes the stratigraphic correspondence, associated radiocarbon dates, and contents of each zone.

It should be kept in mind that the analytic zone may encompass a large cut of complex site stratigraphy. Rather than representing a single circumscribed occupation, it usually comprises numerous activities occurring over a long span of time. Analytic zones may be viewed as cultural occupations or as cultural components. For instance, if a living surface is identified within a zone, it may be referred to as an occupation--a definable set of activities that may be isolated within a limited span of time. If cultural affiliation can be documented, a defined occupation or series of occupations within a zone or zones may be called a cultural component.

All of the zones at 45-DO-242, except Zone 14, appear to be primary cultural deposits, revealing artifact distributions in direct association with activity areas and other cultural features. All three of the upper zones also have radiocarbon dates, which allow us to construct a basic cultural sequence for the site.

ZONE 14

Cultural materials from DU II, Stratum 600, comprise Zone 14. This is the smallest of the cultural assemblages and contains no associated cultural features. Exposed in most excavation units, this zone showed uniformly sparse distributions of cultural materials. In most unit levels, deposits consisted

Table 2-3. Analytic zones of 45-DO-242: stratigraphic definition, radiocarbon dates, and contents.

Zone	Depositional Unit	Stratum	Major Description	Radiocarbon[1] Dates (Years B.P.)	Lithic #	Nonlithic #	Bone # wt (g)	Shell # wt (g)	FMR # wt (g)	Hist-Misc #	Total	# Features	Volume (m^3)	Density Objects (m^3)
11	III	100	Surface organic mat and poorly sorted aeolian material	237±80 340±70	909	20	3,510 441	1,728 10,156	850 188,126	2	6,884	5	30.5	225.7
12	II	200	Poorly sorted slope wash and alluvial fan sediments	556±89 701±86 738±67 914±66	1,847	42	5,720 1,749	1,008 5,584	489 257,108	10	9,025	7	33.0	273.5
13	II	300 400 500	Moderately well-sorted slope wash and alluvial fan material	3086±332 3912±459	4,310	141	48,840 18,541	3,188 6,539	1,122 274,481	13	57,546	16	69.7	825.6
14	II	600	Predominantly slope wash, alluvium and colluvium.		74	4	559 196	6 -	12 5,960	2	665	-	20.3	32.9

1 See Appendix A, Table A-1.

of little more than a few flakes and small fragments of rodent bone. Zone 14 predates the 3912+459 B.P. radio carbon date taken from the floor of Housepit 2 in Zone 13.

ZONE 13

Zone 13 incorporates a large part of DU II, including Stratum 500, 400, and 300. It contained by far the largest and most varied artifact assemblage of the four zones defined at 45-DO-242. Counts in all artifact categories were consistently high. The number of whole and fragmented bones, in particular, is higher than in other zones. This zone also contained fifteen cultural features, more than double the number observed in any of the other zones. Excavated in all units, Zone 13 showed the greatest intensity of cultural activity, partly as a consequence of the presence of several deeply dug pit structures. The floor of Housepit 2 yielded two radio carbon dates, 3012 +459 B.P. and 3066+232 B.P., which places the earliest well-defined occupation for Zone 3 between 4000-3000 B.P. Diagnostic artifacts recovered from the upper part of Zone 13 indicate a terminal date of no loter than ca. 2500-2000 B.P.

ZONE 12

Zone 12 corresponds to Stratum 200, DU II and produced the next most numerous and varied artifact assemblage. Though high, counts in all artifact categories did not approach the levels reached in Zone 13. Not recorded in all excavation units, this zone nevertheless held eight cultural features. A radiocarbon date of 914+86 B.P. marks the earliest occupation defined in Zone 12, a thick cultural stratum at the top of DU II, Stratum 300. Occupation of Zone 12 continues on from that date until 556±89 B.P. (TX-4178), a radiocarbon date taken from a firepit in a cultural stratum marking the transition to Zone 11. There is therefore a hiatus in the archaeological record from approximately 2000 B.P., the latest date in Zone 13, to approximately 1000 B.P.

ZONE 11

This zone was quite shallow, encompassing DU III, Stratum 100, which is defined as the surface mat and poorly sorted aeolian material. Artifact counts were lower than those observed in either Zone 12 or Zone 13, but significantly higher than those recorded for Zone 14. Five cultural features were identified. Zone 11 has several late occupations, two of which are documented at 340+70 B.P. (TX-4177) and 237+80 B.P. (TX-4172).

SITE 45-DO-243

Four distinct peaks in artifact frequencies were defined as sitewide analytic zones at 45-DO-243. Stratigraphic definition, radiocarbon dates, and contents of each zone are summarized in Table 2-4.

Table 2-4. Analytic zones of 45-DO-243: stratigraphic definition, radiocarbon dates, and contents.

Zone	Depositional Unit	Stratum	Major Description	Radiocarbon[1] Dates (Years B.P.)	Lithic #	Nonlithic #	Bone # wt (g)	Shell # wt (g)	FMR # wt (g)	Hist-Misc. #	Total	# Features	Volume (m^3)	Density Objects (m^3)
21	III	100 110	Surface litter mat and wind-modified alluvium.		526	-	1,039 346	10 13	14 1,600	1	1,647	-	25.5	64.6
		350	Silty overbank deposit											
		325	River deposited sand											
22	III	125 150 175	Ephemeral stream deposit and wind-modified alluvial fan material.	1512±64	872	3	2,382 1,081	255 802	13 2,800	3	3,665	3	23.3	157.3
23	II	225 250 310	Alluvial fan material with increased gravel content and silty bands.		597	3	2,239 873	841 3,355	1 5,000	-	3,873	3	17.9	216.4
24	I	320 321 325 350	Slope wash deposit of banded sand and gravel		258	2	834 491	116 368	1 220	1	1,230	1	16.2	67.6

[1] See Appendix A, Table A-2.

There are at least three analytic zones with primary cultural deposits. These cultural occupations, however, did not produce nearly the range of feature types and distributions recorded at 45-DO-242, nor did they yield nearly as many lithic, shell or bone artifacts. No occupation appears to have been of long duration, and none appears to represent a large number of people. Stratigraphic separation is evident only in the accumulation of artifacts in different geologic strata. A single date of about 1500 B.P. for Zone 2 suggests that at least one site occupation occurred at about the same time that cultural activity was present in the lower stratum of Zone 2 at 45-DO-242.

ZONE 24

Zone 24 consists of a very small assemblage of cultural materials in sandy strata overlying the basal cobble layer at the site (Stratum 321, Stratum 320, DU I). Lithics, shell, bone, and fire-modified rocks occur in lower counts than in any other analytic zone. The only cultural feature was a small shell concentration.

ZONE 23

This zone encompasses Strata 310, 250 and 225 of DU II. It contains the highest artifact frequencies of any zone at the site. Lithic artifacts are less numerous in this zone than in the upper Zone 22 assemblage but shell fragments occur in markedly higher numbers. The three identified cultural features indicate that this zone contains primary cultural deposits.

ZONE 22

Zone 22 corresponds to Strata 175, 150 and 125 of DU III. It yielded the second largest artifact assemblage, and contained the highest number of lithic tools. Two cultural features were identified, and a radiocarbon date of 1512±64 B.P was obtained from the uppermost sandy stratum, just below the boundary with Zone 1.

ZONE 21

Zone 21 consists of a small but distinct deposit of cultural materials recovered from Strata 110 and 100 at the top of DU III. Although comparable in excavated volume to Zones 22 and 23, this zone yielded a smaller artifact assemblage than either. It does, however, contain fire-modified rocks in quantities comparable to Zone 22: this may indicate a primary cultural deposit or occupation.

3. ARTIFACT ANALYSES

Artifacts recovered from sites 45-DO-242 and 45-DO-243 have been subjected to three separate analyses. Technological analysis describes elements of prehistoric tool manufacture, detailing processes of lithic reduction. Functional analysis describes attributes of wear on tools and develops inferences concerning the use of tools at the site. Stylistic analysis describes morphological elements that have demonstrated temporal and spatial significance and compares recovered artifacts with types defined outside of the project area.

Stone artifacts are treated in the most detail, with other materials entering the classification only when they exhibit specified attributes. Analyses were intentionally biased towards lithics with the assumption that these artifact classes would be of the most value in comparisons with other researchers' work and in developing reconstructions of site activities. Artifacts of bone, shell and other non-lithic materials, though included in the classifications wherever appropriate, are only described in detail selectively.

All artifact analyses take the form of paradigmatic classifications as defined by Dunnell (1971, 1979). In this system, commonly used descriptive terms take on specific meanings. Attributes are selected which can describe morphological variation in the collection. These attributes may correspond to defined stages of tool manufacture, be characteristic of specific tool uses, or indicative of limited periods of time depending on the purpose of the classification. Attributes are combined into sets: those that describe morphological variation in the artifact assemblage without reference to cultural origin are called features, while those that represent cultural activity are called modes. During analysis each artifact is identified by the single feature or mode that characterizes it. By organizing the features and modes into larger organizations termed dimensions, and by cross-tabulating these, sets of comparable and mutually exclusive classes can be formed. From study of these classes, inferences may be drawn concerning the nature of tool manufacture, use, and distribution in time and space.

Our classificatory dimensions and constituent attributes are not always truly exhaustive and must be viewed as gross analytic categories designed to signal obvious morphological variation. Whenever possible, our defined attributes approximate characteristics identified in prior research as important technological, functional, or stylistic indicators. Further, it will be apparent that analytic levels within the paradigmatic classifications often preclude direct comparison with more traditional typological approaches. For example, in several instances these analyses will focus on the tool, and

not on the artifacts, because an artifact may have more than one tool or use. These classes are then only related to more standard classifications by cross-correlation with more traditional artifact designations (e.g., biface, drill, or chopper). The following discussion, therefore, involves analysis both at the level of the tool and of the artifact.

In the following subsections we present the descriptive data from technological, functional, and stylistic analysis. The bulk of the data are summarized in tabular form, with text largely reserved for discussion and interpretation of major points. Brief explanations of dimensions and attributes used in each analysis are presented at the beginning of each subsection.

Discussion will treat the two site assemblages separately since the two stratigraphic sequences are distinct, and we cannot, with any certainty, correlate the separate zones. For ease in comparison, all data tables will include both site assemblages. Analysis will be confined to the level of the analytic zone because of difficulties in the identification and excavation of cultural features in the field and the subsequent lack of horizontal exposure. Whenever applicable, as in the stylistic analysis of projectile points, or in the analysis of cultural features, we will identify the feature provenience of individual artifacts but such detailed provenience data will play no part in the technological and functional analyses to follow.

TECHNOLOGICAL ANALYSIS

Prior researchers have described general manufacturing sequences in the production of stone tools, and have thereby identified specific morphological elements associated with certain methods of production and particular steps in the reductive sequence (e.g., Crabtree 1972, 1967a,b; Flenniken and Garrison 1975; Muto 1971, 1976; Smith and Goodyear 1976; Speth 1972; Stafford 1977; Swanson 1975).

While the process of lithic reduction may vary greatly even within defined industries, an idealized trajectory of reduction, with certain fundamental steps, can be constructed. First, the knapper selects a nodule which will serve as a core for the production of flakes of suitable size and shape. The first flakes removed exhibit the weathered surface of the stone. Later flakes show little or no weathered surface, and may have flake scars from the initial flaking. All of these flakes may be removed with a hard hammer of stone, and this creates distinctive large flakes with pronounced bulbs of percussion, strong stress lines and crushed striking platforms. Once flakes are of a suitable size, the knapper modifies them further with a soft hammer of antler or wood, producing smaller flakes with less pronounced bulbs of percussion, finer stress lines, and little or no crushing of the striking platforms. Later, after the artifact has been roughed out to the desired shape, the knapper may remove still smaller flakes with an antler tine to sharpen, finely shape, and maintain working edges on the tool.

This is, of course, an extreme simplification. Not only are there innumerable variations in the sequence of steps and tools used, there are also several related processes with distinctive steps and products. The above

description characterizes a flake tool technology, wherein hammers of different materials are used to detach thin, lammellar flakes by direct percussion. There is a related blade industry, in which hammers or punches are used to create long, narrow flakes with prismatic cross sections. This technique requires a more prepared core, and may involve indirect as well as direct percussion (cf., Leonhardy and Muto 1972; Muto 1976). In turn, these industries may be contrasted with the microblade industry in which small, carefully prepared wedge-shaped cores are created and fine fabricators are used for detachment of flakes. Very small, thin blades with one or more arrises are produced, which are in themselves finished tool forms requiring no further modification (cf., Sanger 1968, 1970). While clearly distinct, these three industries need not have been independent, as one could easily complement the others as part of a more comprehensive industry. That this is in fact the case is suggested by the presence of flake and blade industries in early assemblages on the Columbia Plateau (Leonhardy and Rice 1970; Leonhardy et al. 1971).

Artifact types are the best practical indicators of lithic industries (e.g., cores, blades and flakes, and tools made from blades or flakes). Core configuration is distinctive; flakes, blades and microblades are also readily distinguished. Tools often evidence attributes of origin like arris remnants or striking platforms. Other characteristics, though quite recognizable, are less certain diagnostic indicators, and often blend into the general signposts of lithic reduction outlined above (e.g., detritus, flake size, presence or absence of cortex, etc.).

In technological analysis, we record attributes indicative of these steps in stone tool manufacture, and characteristic of these three reduction techniques. In technological analysis we used seven dimensions: OBJECT TYPE, MATERIAL, CONDITION, DORSAL TOPOGRAPHY, TREATMENT, KIND OF MANUFACTURE, and MANUFACTURE DISPOSITION. These describe the kind and condition of artifacts and the materials from which they are made. Descriptive attributes of WEIGHT, LENGTH, WIDTH and THICKNESS were also measured to supplement the classificatory dimensions. Table 3-1 lists these dimensions and attributes.

Before describing the technological assemblage from 45-DO-242 and 45-DO-243, we must advance several cautionary notes. First, analysis at both sites was done by at least seven different analysts over periods of many months. In that time, material type categories were added, and previously defined types were not corrected after these changes. The most important effect of this procedure is that in only the last few units at both sites was opal recorded as a separate category. For all units done previously, opal was included under the category jasper. Further, seven of the 21 units at 45-DO-242 received an abbreviated form of analysis termed LITHAN-AB, which entailed measurement of only those objects designated as functional types and pulled for functional analysis. All other objects were recorded only for material type and attributes of dorsal topography. Figure 3-1 shows the distribution of excavation units at 45-DO-242 analyzed under the two frameworks.

Table 3-1. Technological dimensions.

DIMENSION I: OBJECT TYPE

- Conchoidal flake
- Chunk
- Core
- Linear flake
- Unmodified
- Tabular flake
- Formed object
- Weathered
- Indeterminate

DIMENSION II: RAW MATERIAL*

- Jasper
- Chalcedony
- Petrified Wood
- Obsidian
- Opal
- Quartzite
- Fine-grained quartzite
- Basalt
- Fine-grained basalt
- Silicized mudstone
- Argillite
- Granite
- Siltstone/mudstone
- Schist
- Graphite/molybdenite
- Bone/antler
- Ochre
- Shell
- Dentalium

DIMENSION III: CONDITION

- Complete
- Proximal fragment
- Proximal flake
- Less than 1/4 inch
- Broken
- Indeterminate

DIMENSION IV: DORSAL TOPOGRAPHY

- None
- Partial cortex
- Complete cortex
- Indeterminate/not applicable

DIMENSION V: TREATMENT

- Definitely burned
- Dehydrated (heat treatment)

ATTRIBUTE I: WEIGHT

Recorded weight in grams

ATTRIBUTE II: LENGTH

Flakes: length is measured between the point of impact and the distal end along the bulbar axis

Other: length is taken as the longest dimension

ATTRIBUTE III: WIDTH

Flakes: width is measured at the widest point perpendicular to the bulbar axis

Other: width is taken as the maximum measurement along an axis perpendicular to the axis of length

ATTRIBUTE IV: THICKNESS

Flakes: thickness is taken at the thickest point on the object, excluding the bulb of percussion and the striking platform

Other: thickness is taken as the measurement perpendicular to the width measurement along an axis perpendicular to the axis of length

* Only those raw materials recorded from the site are listed here; a complete list is available in the Project's Research Design (Campbell 1984d).

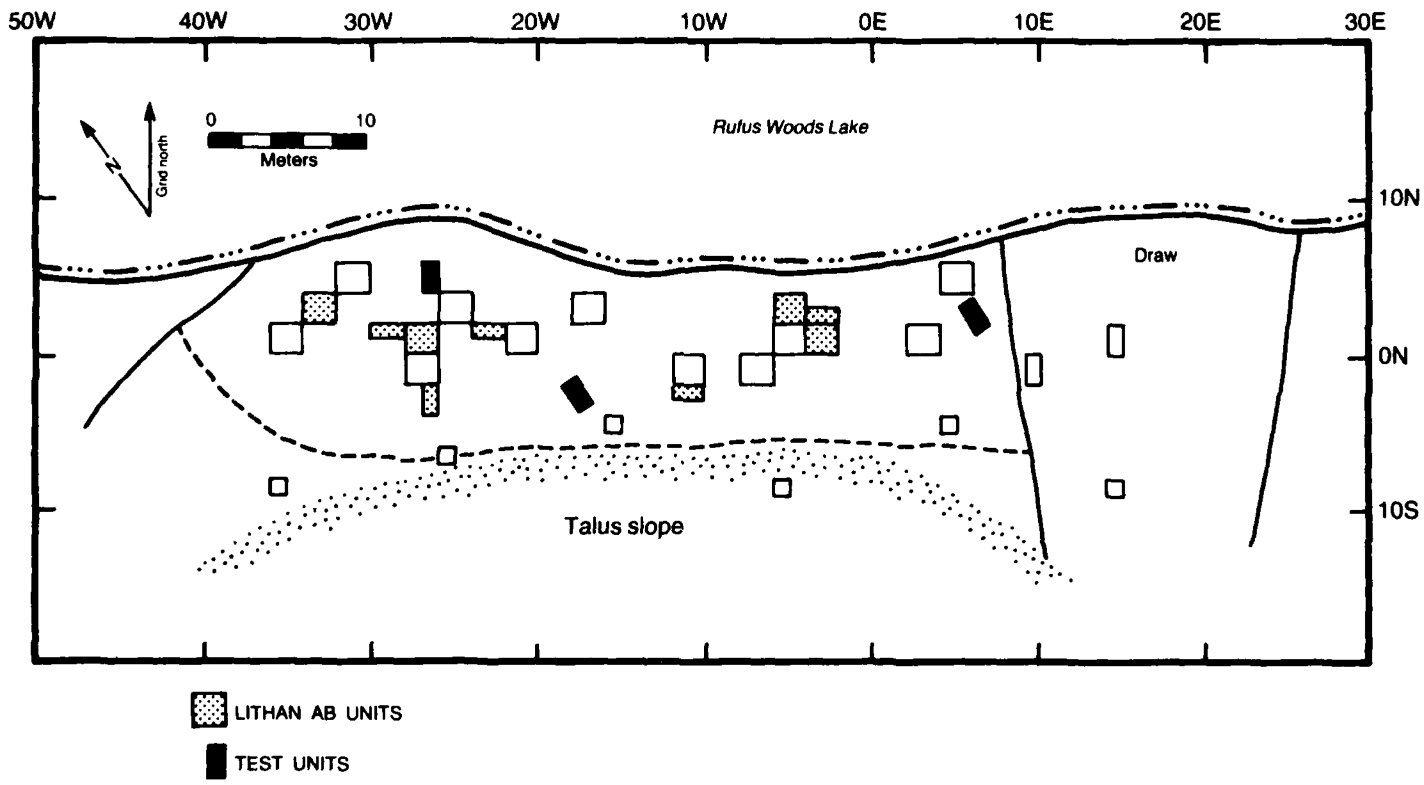


Figure 3-1. Distribution of excavation units analyzed under different procedures, 45-DO-242.

MATERIAL TYPES

Table 3-2 presents counts of material types by analytic zones. As shown, the bulk of material from both sites was jasper and chalcedony. Other cryptocrystalline stones occurred in lesser amounts, with frequency falling off in direct relation to crystalline structure, i.e., fine-grained, conchoidally-fracturing stones are more numerous than coarse-grained, non-conchoidally-fracturing stones. In all zones, jasper and chalcedony constitute 56-80% of the material recorded. With the exceptions of quartzite, opal and argillite, no other material constitutes more than 4% of any zonal assemblage, and most fall below 1%. Distributions across zones are very uniform. The most obvious trend shown in the table is a marked preference for jasper at 45-DO-243, with chalcedony, quartzite and argillite fairly evenly distributed across zones.

Non-lithic materials were rare at both sites, and consisted entirely of low frequencies of ocher and bone/antler. Ocher was present only at 45-DO-242, and never exceeds more than 2% of any zonal total. Bone, although present at both sites, was usually below 1% and only once reached 2% (Zone 13, 45-DO-242).

OBJECT TYPES

Most stone objects at both sites were of cryptocrystalline mineral (Table 3-3). Jasper and chalcedony were the favored materials for all object types except tabular flakes and unmodified forms. Conchoidal flakes, linear flakes, chunks, cores and formed objects reflect the preponderance of jasper and chalcedony in the artifact assemblages. For certain object types, one or the other of the two materials was apparently preferred: most linear flakes were made of chalcedony (10 of 12 specimens); most cores were of jasper (6 of 7 specimens). The lack of jasper and chalcedony for tabular flakes would seem to be a matter of tool selection rather than material preference, since tabular flakes are produced most readily from a local quartzite that fractures in tabular planes. The unmodified category shows no cryptocrystalline stones since hammerstones or grinding stones are best made from coarse-grained stones that pit or abrade but do not fracture readily.

Conchoidal flakes are the most common objects in the collection, comprising 5647 specimens or 80% of the total at 45-DO-242, and 1824 specimens or 81% of the total at 45-DO-243. Tabular flakes, chunks and formed objects constitute the majority of other forms. Tabular flakes total 580 specimens or 8% of the artifacts at 45-DO-242, and 157 specimens or 7% of the artifacts at 45-DO-243. Chunks total 420 specimens or 6% of the artifacts at 45-DO-242, 105 specimens or 5% of the artifacts at 45-DO-243. Formed objects total only 218 specimens or 4% of the artifacts at 45-DO-242, and only 51 specimens or 2% of the artifacts at 45-DO-243.

Most object types at both sites occur in the upper three analytic zones. Within this general pattern, only Zone 13 at 45-DO-242 shows any pronounced variation, with 4395 specimens or 63% of the total number recovered from that site. This number reflects the intensive occupation evidenced in this zone,

Table 3-2. Material by zone, 45-DO-242 and 45-DO-243.

Material	45-DO-242					45-DO-243				
	Zone				Total	Zone				Total
	11	12	13	14		21	22	23	24	
Jasper	616	767	1,918	46	3,347	303	666	405	134	1,508
Col %	61	42	42	52	45	52	66	59	48	59
Chalcedony	183	602	1,773	13	2,581	71	100	48	21	240
Col %	19	33	39	15	34	12	10	07	08	09
Quartzite	82	223	381	19	715	42	69	49	28	189
Col %	09	12	08	22	10	07	07	07	10	07
Opal	35	115	208	-	358	75	46	28	13	162
Col %	04	06	05	00	05	13	05	04	05	06
Argillite	1	12	10	-	23	54	73	83	23	233
Col %	00	01	00	00	00	09	07	12	08	09
Ochre	13	36	104	2	155	-	-	-	-	-
Col %	01	02	02	02	02	00	00	00	00	00
Fine-grained quartzite	9	17	65	1	92	8	8	30	9	55
Col %	01	01	01	01	01	01	01	04	03	02
Fine-grained basalt	2	4	8	1	15	11	12	20	31	74
Col %	00	00	00	01	00	02	01	03	11	03
Bone/Antler	7	6	37	2	52	-	3	3	2	8
Col %	01	00	01	02	01	00	00	00	00	00
Basalt	9	5	20	-	34	4	7	4	5	20
Col %	01	00	00	00	01	01	01	01	02	01
Silicized mudstone	8	13	23	2	46	-	-	1	1	2
Col %	01	01	01	02	01	00	00	00	00	00
Obsidian	-	2	3	-	5	12	8	15	5	40
Col %	00	00	00	00	00	02	01	02	02	02
Petrified wood	1	9	8	-	18	3	9	4	-	16
Col %	00	01	00	00	00	01	01	01	00	01
Silt/Mudstone	4	1	9	-	14	-	9	2	2	13
Col %	00	00	00	00	00	00	01	00	01	01
Granite	2	5	8	-	15	-	1	-	-	1
Col %	00	00	00	00	00	00	00	00	00	00
Schist	3	-	2	-	5	-	-	-	-	-
Col %	00	00	00	00	00	00	00	00	00	00
Shale	-	-	1	-	1	-	1	-	3	4
Col %	00	00	00	00	00	00	00	00	00	00
Sandstone	1	1	2	-	4	-	-	-	-	-
Col %	00	00	00	00	00	00	00	00	00	00
Steatite	-	-	3	-	3	-	-	-	-	-
Col %	00	00	00	00	00	00	00	00	00	00
Indeterminate/misc	2	10	13	2	27	1	3	-	1	5
Col %	00	01	00	02	00	00	00	00	00	00
TOTAL	898	1,828	4,586	88	7,510	584	1,015	682	279	2,570

Table 3-3. Object type by material by zone, 45-DO-242 and 45-DO-243. Weathered and indeterminate objects not included.

Object type	45-DO-242					45-DO-243				
	Zone				Total	Zone				Total
	11	12	13	14		21	22	23	24	
Conchoidal flake										
Jasper	497	587	1,631	32	2,747	238	495	306	111	1,149
Chalcedony	154	537	1,629	10	2,330	67	85	43	19	214
Petrified wood	1	9	8	-	18	3	7	1	-	11
Obsidian	-	1	2	-	3	10	7	12	4	33
Opal	31	100	193	-	324	61	44	24	13	142
Quartzite	4	18	54	2	78	9	10	3	8	30
Fine-grained quartzite	6	9	52	-	67	7	8	27	6	48
Basalt	4	2	10	-	16	4	6	3	3	16
Fine-grained basalt	2	1	5	1	9	11	10	20	26	67
Silicized mudstone	4	9	16	2	31	-	-	1	1	2
Argillite	1	9	7	-	17	50	63	76	20	209
Granite	-	-	-	-	-	-	1	-	-	1
Indeterminate/misc	-	3	4	-	7	-	1	-	1	2
Linear flake										
Jasper	1	-	1	-	2	2	3	-	4	9
Chalcedony	2	2	6	-	10	-	1	-	-	1
Tabular flake										
Chalcedony	-	-	-	-	-	-	1	-	-	1
Petrified wood	-	-	-	-	-	-	-	1	-	1
Quartzite	72	182	282	14	560	31	55	43	21	150
Fine-grained quartzite	2	3	7	-	12	-	-	2	2	4
Sandstone	-	1	1	-	2	-	-	-	-	-
Schist	2	-	1	-	3	-	-	-	-	-
Indeterminate/misc.	-	2	1	-	3	-	1	-	-	1
Chunk										
Jasper	20	46	112	7	185	11	37	18	4	70
Chalcedony	14	23	69	2	108	-	3	2	1	6
Petrified wood	-	-	-	-	-	-	2	2	-	4
Obsidian	-	-	1	-	1	-	1	-	-	1
Opal	4	11	11	-	26	6	1	1	-	8
Quartzite	15	11	25	1	52	1	-	-	-	1
Fine-grained quartzite	1	3	5	1	10	1	-	-	-	1
Basalt	2	1	2	-	5	-	-	-	-	-
Fine-grained basalt	-	-	1	-	1	-	-	-	-	-
Silicized mudstone	4	2	6	-	12	-	-	-	-	-
Argillite	-	1	-	-	1	-	1	1	-	2
Silt/Mudstone	2	1	9	-	12	-	9	-	-	9
Steatite	-	-	1	-	1	-	-	-	-	-
Schist	1	-	1	-	2	-	-	-	-	-
Shale	-	-	-	-	-	-	-	-	3	3
Indeterminate/misc	-	2	1	1	4	-	-	-	-	-
Core										
Jasper	-	3	3	-	6	1	-	-	-	1
Chalcedony	-	1	-	-	1	-	-	-	-	-
Opal	-	-	2	-	2	-	-	-	-	-
Basalt	-	-	1	-	1	-	-	-	1	1
Formed object										
Jasper	39	33	67	1	140	10	14	5	4	33
Chalcedony	14	16	39	-	69	1	-	1	-	2
Obsidian	-	1	-	-	1	1	-	-	-	1
Opal	-	3	2	-	5	-	-	2	-	2
Quartzite	-	3	3	-	6	-	3	-	-	3
Fine-grained quartzite	-	-	-	-	-	-	-	1	-	1
Basalt	2	-	3	-	5	-	-	-	1	1
Fine-grained basalt	-	2	2	-	4	-	1	-	2	3
Silicized mudstone	-	2	1	-	3	-	-	-	-	-
Argillite	-	-	2	-	2	-	1	-	2	3
Granite	-	-	1	-	1	-	-	-	-	-
Sandstone	1	-	-	-	1	-	-	-	-	-
Silt/Mudstone	-	-	-	-	-	-	-	-	2	2
Steatite	-	-	2	-	2	-	-	-	-	-
Indeterminate/misc	-	1	7	1	9	-	-	-	-	-
Unmodified										
Quartzite	1	-	2	-	3	-	-	-	-	-
Fine-grained quartzite	-	1	1	-	2	-	-	-	-	-
Basalt	1	2	2	-	5	-	-	1	-	1
Fine-grained basalt	-	1	-	-	1	-	-	-	-	-
Granite	-	2	-	-	2	-	-	-	-	-
Shale	-	-	1	-	1	-	1	-	-	1
Indeterminate/misc	-	2	-	-	2	-	-	-	-	-
TOTAL	904	1,649	4,395	75	7,023	525	872	595	259	2,251

wherein three housepits, three external firepits and six other pits were noted in association with a series of living surfaces (see Chapter 5 that describes cultural features and associated artifact assemblages). Zone 13 produced consistently higher counts in every object category, in some cases tripling the next highest zonal count.

MANUFACTURE

Chipping is the only form of manufacture recorded for object types in either site assemblage (Table 3-4). However, only 5.1% of the objects from 45-DO-242 and 3.8% of the objects from 45-DO-243, show any evidence of manufacture beyond initial removal from a core. The proportion of chipped objects across zonal assemblages ranges from a high of 9.3% in Zone 11 to a low of 1.3% in Zone 14, with most zonal assemblages showing about 3-5% chipped objects.

Table 3-4. Type of manufacture by zone, 45-DO-242 and 45-DO-243.

Type of manufacture	45-DO-242					45-DO-243				
	Zone				Total[1]	Zone				Total[1]
	11	12	13	14		21	22	23	24	
None	819	1,566	4,119	73	6,577	511	825	576	245	2,157
Col %	89.9	94.5	95.3	96.1	94.4	97.0	94.3	96.5	94.6	95.5
Chipping	85	89	182	1	357	16	40	18	12	86
Col %	9.3	5.4	4.2	1.3	5.1	3.0	4.6	3.0	4.6	3.8
Indeterminate	7	2	22	2	33	-	10	3	2	15
Col %	0.8	0.1	0.5	2.6	0.5	0.0	1.1	0.5	0.8	0.7
TOTAL	911	1,657	4,323	76	6,967	527	875	597	259	2,258

[1] <1/4 in flakes and non-lithics deleted.

Heat treatment prior to manufacture is not well represented in any zonal assemblage (Table 3-5). However, all analytic zones show some evidence of burning or dehydration, and we may assume that heat treatment was present, although not commonly practiced.

Both primary and secondary reduction were prevalent at both sites over the span of occupation (Table 3-6). The proportion of objects with cortex remnants is remarkably consistent across all zones, ranging from about 8-11% at 45-DO-242 and from about 4-6% at 45-DO-243. The distribution of objects without cortex parallels that observed for object types, with high peaks in Zone 13, 45-DO-242, and Zone 22, 45-DO-243. Objects with partial and complete cortex repeat this pattern at 45-DO-242, but at 45-DO-243 Zones 21, 22 and 23, have much more even counts. It is also interesting to note that proportions of attributes are virtually identical at the two sites. Objects without cortex number 6,120 specimens or 85% of the total at 45-DO-242 and 2,080 specimens or 92% of the total at 45-DO-243. Objects with partial and complete cortex number 160 specimens or 8% of the total at 45-DO-242 and 166 specimens

Table 3-5. Treatment by zone, 45-DO-242 and 45-DO-243.

Treatment	45-DO-242					45-DO-243				
	Zone				Total	Zone				Total
	11	12	13	14		21	22	23	24	
None	892	1,628	4,255	73	6,848	510	842	553	255	2,160
Col %	98	98	98	96	98	98	96	93	98	97
Burned	18	28	59	3	108	12	10	5	1	28
Col %	02	02	01	04	02	02	01	01	00	01
Dehydrated	1	1	9	-	11	5	23	39	3	70
Col %	00	00	00	00	00	00	03	06	01	03
TOTAL	911	1,657	4,323	76	6,967	527	875	597	259	2,258

Table 3-6. Dorsal topography by zone, 45-DO-242 and 45-DO-243.

Dorsal topography	45-DO-242					45-DO-243				
	Zone				Total	Zone				Total
	11	12	13	14		21	22	23	24	
None	814	1,439	3,802	65	6,120	491	805	546	238	2,080
Col %	89	87	88	85	88	93	92	92	92	92
Partial cortex	61	115	311	5	492	22	29	30	13	94
Col %	07	07	07	07	07	04	03	05	05	04
Complete cortex	5	20	40	3	68	2	2	5	3	12
Col %	01	01	01	04	01	00	00	01	01	00
Indeterminate	31	83	170	3	287	12	39	16	5	72
Col %	03	05	04	04	04	02	04	02	02	03
TOTAL	911	1,657	4,323	76	6,967	527	875	597	259	2,258

or 5% of the total at 45-DO-243. Attributes of dorsal topography are related to material type in Table 3-7, which lists object types by cryptocrystalline and non-cryptocrystalline material groups and by the presence or absence of cortex. Although both sites evidence primary and secondary reduction, there are some marked differences in the zonal distributions of object types with cortex. For example, at 45-DO-242, 71% of the specimens with cortex are cryptocrystalline stones, while at 45-DO-243, 76% of the specimens with cortex are non-cryptocrystalline stones. Also, about 4% of the total number of conchoidal flakes at 45-DO-242 have cortex, whereas only 2% of conchoidal flakes at 45-DO-243 have cortex. There appears to have been less primary reduction of cryptocrystalline stones at 45-DO-243 than at 45-DO-242, although the kinds of object types and their relative proportions across zones are similar. This inference is borne out by the absence of cores from 45-DO-243. Of course, the prevalence of non-cryptocrystalline objects with cortex attests

Table 3-7. Technological classes[1] by zone, 45-DO-242 and 45-DO-243.

Technological Class	45-DO-242					45-DO-243				
	Zone				Total	Zone				Total
	11	12	13	14		21	22	23	24	
Conchoidal flakes										
No cortex										
Cryptocrystalline	670	1,187	3,314	41	5,222	371	613	376	143	1,503
Other	18	37	102	4	161	69	94	112	61	336
Partial cortex										
Cryptocrystalline	7	20	126	1	154	3	4	1	1	9
Other	4	10	41	1	56	9	3	13	3	28
Complete cortex										
Cryptocrystalline	-	1	1	-	2	-	-	-	-	-
Other	-	1	8	-	9	-	-	-	-	-
Linear flakes										
No cortex										
Cryptocrystalline	3	4	10	-	17	2	4	-	5	11
Partial cortex										
Cryptocrystalline	-	1	1	-	2	-	-	-	-	-
Tabular flakes										
No cortex										
Cryptocrystalline	-	-	-	-	-	-	1	1	-	2
Other	45	119	180	9	353	21	36	26	14	97
Partial cortex										
Other	27	51	92	3	173	8	17	14	6	45
Complete cortex										
Other	4	15	28	2	49	2	2	5	3	12
Chunks										
No cortex										
Cryptocrystalline	25	24	69	7	125	15	42	22	3	82
Other	7	3	5	1	16	1	1	1	3	6
Partial cortex										
Cryptocrystalline	2	5	9	-	16	1	1	-	-	2
Other	14	14	25	-	53	1	-	-	-	1
Cores										
No cortex										
Cryptocrystalline	-	4	3	1	8	1	-	-	-	1
Partial cortex										
Cryptocrystalline	-	1	2	-	3	-	-	-	-	-
Other	-	-	1	-	1	-	-	-	1	1
Formed objects										
No cortex										
Cryptocrystalline	49	48	104	1	202	11	12	8	4	35
Other	-	1	6	-	7	-	1	-	3	4
Partial cortex										
Cryptocrystalline	4	4	3	-	11	-	-	-	-	-
Other	2	5	8	-	15	-	4	1	2	7
Unmodified										
Partial cortex										
Other	1	4	2	-	7	-	-	1	-	1
Complete cortex										
Other	1	2	3	-	6	-	-	-	-	-

[1] The technological classes used are object type by dorsal topography by material.

to primary reduction of stones at 45-DO-243, but it seems that most cryptocrystalline tool forms recovered from that site were probably brought in as finished forms or were reduced from flakes or blanks.

The distribution of flake size can also be taken as an indicator of secondary reduction on the sites. Table 3-8 shows the distribution of flake size by material throughout the eight analytic zones. The majority of all specimens are >1/4 in in size (96% at 45-DO-242 and 88% at 45-DO-243). Less than 1/4 in flakes are comparatively rare (5% at 45-DO-242; and 12% at 45-DO-243). Less than 1/8 in flakes, a few of which were recovered, are not discussed here as they were not reliably sampled with a 1/8-in screen. Across analytic zones, the distribution of flake size shows some marked variations. Within 45-DO-242, Zone 13, which contains the most intensive cultural activity in the form of a number of housepits, has by far the lowest proportion of <1/4 in flakes. The highest proportions of <1/4 in flakes at 45-DO-243, occur in Zones 22 and 23, which are roughly contemporaneous with the cultural activities represented in Zone 13 at 45-DO-242. This pattern might indicate greater attention to secondary reduction, perhaps in the form of tool refinishing or maintenance at 45-DO-243 during the time that 45-DO-242 was the scene of a housepit settlement. Whether the two sites were in use at the same time is certainly open to conjecture, but the pattern of smaller flakes at 45-DO-243 during the Hudnut Phase is possibly suggestive of the spatial distribution of related activities. Regardless of the relationship of activities at the two sites, it is evident that secondary reduction was common at both locations. That the vast majority of <1/4 in flakes are jasper and chalcedony is consistent with the greater number of object types, particularly formed object types, in those two material types.

Distinctions between primary and secondary reduction are also brought out in Table 3-9, which lists length, thickness and width measurements of conchoidal flakes. The table clearly reveals the distinction between primary and secondary flakes--these latter are much less thick and wide. Length seems to be a less sensitive measure, although it still evidences the trend for decreasing size. Neither the size of secondary or primary flakes varies much from zone to zone or from site to site (variable statistics occur with smaller sample sizes in any given zone). Primary flakes vary the most, and we might predict as much given the differences in the occurrence of raw materials and variation in their internal structure: some stones may be found in smallish, eroded nodules, others may occur as large veins or outcrops. Only when flakes are further reduced into tools or formed objects is consistency in length, width or thickness achieved.

INDUSTRIES

All of the stages of the lithic manufacturing process are represented by the object types recovered from sites 45-DO-242 and 45-DO-243: raw materials, cores, flakes, and finished tools. As stated, flakes, predominantly of cryptocrystalline, conchoidally-fracturing stones, constitute the most plentiful object type. Cores are well represented at 45-DO-242 but rare at

Table 3-8. Flake size by material and zone, 45-DO-242 and 45-DO-243.

Flake size (in) by material	45-DO-242					45-DO-243				
	Zone				Total	Zone				Total
	11	12	13	14		21	22	23	24	
Jasper										
>1/4	558	870	1,818	41	3,087	283	550	328	123	1,284
<1/4	58	94	98	5	255	40	111	75	11	238
<1/8	-	3	2	-	5	-	5	1	-	6
Chalcedony										
>1/4	165	582	1,748	12	2,525	68	90	46	20	224
<1/4	8	20	27	1	56	3	10	2	1	16
Quartzite										
>1/4	92	215	278	17	702	41	68	46	29	184
<1/4	-	8	3	2	13	1	1	3	-	5
Opal										
>1/4	35	114	208	-	357	67	45	27	13	152
<1/4	-	1	-	-	1	8	1	1	-	10
Argillite										
>1/4	1	10	9	-	20	50	65	77	22	214
<1/4	-	2	1	-	3	4	8	6	1	19
Fine-grained quartzite										
>1/4	9	17	65	1	92	8	8	30	8	54
Fine-grained basalt										
>1/4	2	4	8	1	15	11	11	20	28	70
<1/4	-	-	-	-	-	-	1	-	3	4
Basalt										
>1/4	9	5	19	-	33	4	7	4	5	20
<1/4	-	-	1	-	1	-	-	-	-	-
Obsidian										
>1/4	-	2	3	-	5	11	8	12	4	35
<1/4	-	-	-	-	-	1	-	3	1	5
Petrified wood										
>1/4	1	9	8	-	18	3	9	4	-	16
Silt/Mudstone										
>1/4	4	1	9	-	14	-	9	2	2	13
Granite										
>1/4	1	4	8	-	13	-	1	-	-	1
<1/4	1	1	-	-	2	-	-	-	-	-
Schist										
>1/4	3	-	2	-	5	-	-	-	-	-
Shale										
>1/4	-	-	1	-	1	-	1	-	3	4
Sandstone										
>1/4	1	1	2	-	4	-	-	-	-	-
Steatite										
>1/4	-	-	3	-	3	-	-	-	-	-
Indeterminate/misc										
>1/4	2	10	13	2	27	-	-	-	-	-
TOTAL										
>1/4	911	1,857	4,323	76	6,867	527	672	587	258	2,253
<1/4	67	125	130	8	330	57	132	91	18	298
<1/8	-	4	2	-	6	-	5	1	-	6

Table 3-9. Measurements of conchoidally flaked material by zone, 45-DO-242 and 45-DO-243.

Attributes	45-DO-242					45-DO-243				
	Zone				Total	Zone				Total
	11	12	13	14		21	22	23	24	
Length (mm)										
No cortex										
Cryptocrystalline										
$\bar{x}$	10.2	10.7	10.7	10.7	10.7	10.9	9.6	9.0	8.8	9.5
s.d.	5.5	4.4	5.0	7.9	5.0	5.1	4.1	3.9	2.6	4.3
n	334	693	2,138	26	3,191	194	246	160	65	665
Other										
$\bar{x}$	13.6	17.5	16.1	5.0	16.0	13.5	13.1	12.4	12.6	12.8
s.d.	7.7	9.7	10.6	0.0	10.1	7.9	9.2	8.3	8.7	8.4
n	10	24	62	2	98	32	24	48	26	130
Partial cortex										
Cryptocrystalline										
$\bar{x}$	22.3	16.5	16.3	6.0	16.4	10.3	19.7	0.0	0.0	15.0
s.d	24.9	11.6	16.6	0.0	16.1	4.2	15.3	0.0	0.0	11.3
n	3	11	78	1	93	3	3	-	-	6
Other										
$\bar{x}$	22.3	28.8	36.8	14.0	34.1	18.5	0.0	27.0	53.5	28.4
s.d.	11.2	15.6	34.0	0.0	30.9	7.3	0.0	20.5	20.5	20.0
n	3	5	30	1	39	4	-	11	2	17
Complete cortex										
Other										
$\bar{x}$	0.0	0.0	45.2	0.0	45.2	0.0	0.0	0.0	0.0	0.0
s.d.	0.0	0.0	46.1	0.0	46.1	0.0	0.0	0.0	0.0	0.0
n	-	-	5	-	5	-	-	-	-	-
Thickness (.1mm)										
No cortex										
Cryptocrystalline										
$\bar{x}$	17.4	18.5	20.7	21.8	19.2	15.4	17.1	16.7	15.4	16.4
s.d.	10.7	13.5	15.4	16.7	13.8	9.1	11.6	10.7	10.1	10.7
n	384	389	609	23	1,365	306	464	301	112	1,183
Other										
$\bar{x}$	19.6	28.6	27.1	27.5	26.3	19.5	20.0	19.1	19.5	19.5
s.d.	10.8	24.5	15.6	24.7	16.7	10.7	15.8	13.4	12.6	13.3
n	10	11	50	2	73	60	70	87	41	258
Partial cortex										
Cryptocrystalline										
$\bar{x}$	37.4	38.8	30.9	23.0	32.1	17.0	66.7	0.0	0.0	46.4
s.d.	19.7	21.9	19.8	0.0	20.0	7.0	40.1	0.0	0.0	39.1
n	5	15	100	1	121	3	4	-	-	7
Other										
$\bar{x}$	40.5	67.7	75.7	28.0	70.5	42.1	24.3	75.8	106.00	63.0
s.d.	19.8	41.1	65.1	0.0	58.7	25.3	4.6	69.1	34.6	54.9
n	4	10	37	1	52	8	3	12	3	26
Complete cortex										
Other										
$\bar{x}$	0.0	134.0	83.1	0.0	89.9	0.0	0.0	0.0	0.0	0.0
s.d.	0.0	0.0	80.3	0.0	80.0	0.0	0.0	0.0	0.0	0.0
n	-	1	7	-	8	-	-	-	-	-
Width (1mm)										
No cortex										
Cryptocrystalline										
$\bar{x}$	8.5	9.7	11.1	8.2	10.1	9.4	9.7	9.5	8.4	9.8
s.d.	3.9	5.5	6.6	3.3.	5.8	3.7	3.9	5.9	3.6	4.4
n	186	208	368	12	774	192	255	152	73	682
Other										
$\bar{x}$	10.8	11.8	15.7	22.5	15.1	12.8	14.5	12.4	9.6	12.4
s.d.	9.7	8.8	7.8	19.1	8.6	5.1	10.4	7.6	4.1	7.4
n	5	5	35	2	47	39	31	59	25	146
Partial cortex										
Cryptocrystalline										
$\bar{x}$	17.3	17.5	14.0	0.0	14.8	10.3	17.0	0.0	0.0	13.7
s.d.	12.9	13.0	7.0	0.0	8.2	3.5	4.8	0.8	0.0	5.2
n	3	11	65	-	79	3	3	-	-	6
Other										
$\bar{x}$	28.0	28.8	34.5	18.0	32.4	14.4	0.0	31.4	28.0	28.0
s.d	13.5	13.9	35.1	0.0	31.3	2.9	0.0	28.7	5.6	18.7
n	3	5	29	1	38	5	-	9	3	17
Complete cortex										
Other										
$\bar{x}$	0.0	81.0	28.0	0.0	33.8	0.0	0.0	0.0	0.0	0.0
s.d	0.0	0.0	17.5	0.0	20.1	0.0	0.0	0.0	0.0	0.0
n	-	1	6	-	7	-	-	-	-	-

45-DO-243. Finished or formed tools, although not nearly as numerous as flakes and chunks, are common in all zones at both sites.

Tools manufactured at both 45-DO-242 and 45-DO-243 were the products of at least two related, but distinct industries. One made use, primarily, of CCS stones which had to be gathered some distance away, and transported to the site as cores, blanks or preforms. The other, a more expedient industry, utilized locally available non-cryptocrystalline stones. These two industries resulted in quite distinct products: concholdal flakes, linear flakes, chunks, cores, and formed objects, in the first instance and tabular flakes and cores in the second. The more best represented industry was that concentrating on the reduction of jasper and chalcedony. This generalized flake tool technology produced the largest and most varied tool assemblage at both sites (Table 3-10 and 3-11). The subsidiary flake tool industry focused on the reduction of the locally plentiful quartzite, which, when struck, commonly fractures in tabular planes, producing thick but handy flake tool forms.

Figure 3-2 illustrates salient features of the various material industries documented at sites 45-DO-242 and 45-DO-243. As shown, the generalized flake tool technology comprises the vast majority of debitage, flake tool forms, and formed tool forms recovered from either site. The relative increase in quartzite in the flake tool category reflects the expedient reductive strategy mentioned above. Jasper and chalcedony are consistently the preferred stone, and jasper and chalcedony concholdal flakes are the most numerous form at both sites. Formed objects were manufactured from a wide variety of CCS and non-CCS stones but were generally made of jasper, chalcedony and quartzite. The great majority of all objects exhibit no cortex, and this coupled with the scarcity of cores, indicates that most primary reduction took place away from the sites. Debitage dimensions are remarkably consistent irrespective of zone or site, and clearly demonstrate size differences between products of primary and secondary manufacture.

TEMPORAL AND SPATIAL DISTRIBUTION

There are very few changes in the stone tool assemblages at either site over the span of occupation. Figures 3-3 and 3-4 illustrate the consistency observed in features of the debitage and tool assemblages recovered from each analytic zone. As shown, general aspects of the cryptocrystalline industries are remarkably similar between sites 45-DO-242 and 45-DO-243, with the most noticeable difference being the slightly higher proportion of <1/4 in flakes in the zonal assemblages from 45-DO-243, and the presence of flake tools and formed tools with cortex in the zonal assemblages from 45-DO-242, a pattern which might reflect more secondary reduction/finishing knapping at the former site and more primary reduction at the latter site. There does appear to be a marked difference in the nature of the reduction of non-cryptocrystalline stones at the two sites. As shown in the chart, there are much higher zonal percentages of non-cryptocrystalline concholdal flakes and lower percentages of tabular flakes with and without cortex at 45-DO-243 than at 45-DO-242. This would seem to suggest that reduction of the locally available tabular-fracturing quartzite was not emphasized at 45-DO-243 to the degree that it was

Table 3-10. Material by object type, functional type, dorsal topography, and zone, 45-DO-242.

Material	Object type	Functional type	Dorsal topography	Zone 11	Zone 12	Zone 13	Zone 14	Total[1]
Cryptocrystalline silicate	Conchoidal flake	Projectile point base	None	-	-	1	-	1
		Projectile point tip	None	-	1	-	-	1
		Biface	None	2	2	2	-	6
		Drill	Partial cortex	-	-	1	-	1
		Scraper	None	-	3	6	-	9
			Partial cortex	-	-	1	-	1
		Core	None	-	-	1	-	1
		Resharpening flake	None	1	1	2	-	4
		Bifacially retouched flake	None	3	1	2	-	6
		Unifacially retouched flake	None	11	5	9	-	25
			Partial cortex	-	1	4	-	5
		Utilization only	None	21	20	61	1	103
			Partial cortex	-	4	3	-	7
			Indeterminate	1	1	3	-	5
		None	None	630	1,162	3,228	40	5,060
			Partial cortex	7	15	117	1	140
			Complete cortex	-	1	1	-	2
			Indeterminate	7	16	19	-	42
	Linear flake	Linear flake	None	3	2	7	-	12
	Chunk	Biface	None	2	-	2	-	4
		Graver	None	-	1	-	-	1
		Core	None	-	1	-	1	2
		Bifacially retouched flake	None	-	-	1	-	1
		Unifacially retouched flake	None	2	-	3	-	5
			Partial cortex	-	-	1	-	1
		Utilization only	None	1	-	2	-	3
			Indeterminate	1	-	1	-	2
		Indeterminate	None	1	-	-	-	1
			Indeterminate	-	-	1	-	1
		None	None	17	21	58	6	102
			Partial cortex	2	5	8	-	15
			Indeterminate	12	52	115	2	181
	Core	Biface	None	-	1	2	-	3
			Partial cortex	-	-	1	-	1
		Drill	None	-	1	-	-	1
		Core	None	-	1	-	-	1
			Partial cortex	-	-	1	-	1
		Bifacially retouched flake	None	-	1	-	-	1
		Unifacially retouched flake	None	-	-	1	-	1

Table 3-10. Cont'd.

Material	Object type	Functional type	Dorsal topography	Zone				Total[1]
				11	12	13	14	
Cryptocrystalline silicate	Formed object	Projectile point	None	6	11	22	-	39
			Indeterminate	-	-	1	-	1
		Projectile point base	None	9	5	12	-	26
			Partial cortex	-	-	1	-	1
		Projectile point tip	None	6	7	13	-	26
			Partial cortex	1	1	1	-	3
		Biface	None	15	14	32	-	61
			Partial cortex	2	1	-	-	3
		Drill	None	1	2	3	-	6
			Partial cortex	1	-	-	-	1
		Graver	None	-	1	2	-	3
		Scraper	None	4	4	10	1	19
			Partial cortex	-	1	-	-	1
		Burin spall	None	-	1	-	-	1
		Bifacially retouched flake	None	4	1	5	-	10
			Partial cortex	-	-	1	-	1
		Unifacially retouched flake	None	4	1	5	-	10
			Partial cortex	-	1	-	-	1
			Indeterminate	-	1	-	-	1
	Weathered	Projectile point tip	Indeterminate	-	-	1	-	1
		None	Indeterminate	1	2	3	1	7
	Indeterminate	Biface	None	1	-	-	-	1
		Utilization only	None	-	2	3	-	5
Quartzite	Conchoidal flake	Tabular Knife	Partial cortex	-	1	2	-	3
		None	None	3	11	25	1	40
			Partial cortex	1	5	22	1	29
			Complete cortex	-	1	5	-	6
	Tabular	Tabular knife	None	3	4	8	-	15
			Partial cortex	2	4	8	-	14
			Complete cortex	1	1	1	-	3
		Bead	None	-	1	-	-	1
		None	None	38	112	169	9	328
			Partial cortex	25	47	80	3	155
			Complete cortex	3	13	26	2	44
	Chunk		None	4	-	2	1	7
			Partial cortex	10	10	18	-	38
			Indeterminate	1	1	5	-	7
	Formed object	Chopper	Partial cortex	-	-	1	-	1
		Tabular knife	Partial cortex	-	3	2	-	5
	Weathered	Utilization only	Indeterminate	-	-	1	-	1
		None	Indeterminate	-	1	1	-	2
	Unmodified	Hammerstone	Partial cortex	-	-	1	-	1
			Complete cortex	1	-	1	-	2

Table 3-10. Cont'd.

Material	Object type	Functional type	Dorsal topography	Zone 11	Zone 12	Zone 13	Zone 14	Total[1]
Fine-grained quartzite	Conchoidal flake	None	None	5	7	43	-	55
			Partial cortex	1	2	7	-	10
			Complete cortex	-	-	2	-	2
	Tabular		None	2	2	3	-	7
			Partial cortex	-	-	3	-	3
			Complete cortex	-	1	1	-	2
	Chunk		None	1	1	1	-	3
			Partial cortex	-	2	3	-	5
			Complete cortex	-	-	-	1	1
			Indeterminate	-	-	1	-	1
	Weathered		Indeterminate	-	1	-	-	1
	Unmodified	Hammerstone	Complete cortex	-	1	1	-	2
Basalt	Conchoidal flake	None	None	4	1	9	1	15
			Partial cortex	2	1	6	-	9
			Indeterminate	-	1	-	-	1
	Chunk	Tabular knife	Partial cortex	1	-	-	-	1
		None	None	-	-	1	-	1
			Partial cortex	1	1	2	-	4
	Core	Core	Partial cortex	-	-	1	-	1
	Formed object	Projectile point	None	-	1	1	-	2
		Biface	Partial cortex	-	-	1	-	1
		Chopper	Partial cortex	1	1	3	-	5
		Tabular knife	Partial cortex	1	-	-	-	1
	Unmodified		Partial cortex	1	-	-	-	1
		Hammerstone	Partial cortex	-	2	-	-	2
		Millingstone	Complete cortex	-	-	1	-	1
		Utilization only	Partial cortex	-	1	-	-	1
		Indeterminate	Partial cortex	-	-	1	-	1
	Indeterminate	Tabular knife	None	-	-	1	-	1
Granitic	Conchoidal flake		Complete cortex	-	-	1	-	1
		None	None	1	1	4	-	6
			Partial cortex	-	-	2	-	2
			Indeterminate	-	1	-	-	1
	Formed object	Millingstone	Partial cortex	-	-	1	-	1
	Unmodified	Hopper mortar	Complete cortex	-	1	-	-	1
		Millingstone	Partial cortex	-	1	-	-	1
Obsidian	Conchoidal flake	None	None	-	1	2	-	3
	Chunk		None	-	-	1	-	1
	Formed object	Projectile point base	None	-	1	-	-	1

Table 3-10. Cont'd.

Material	Object type	Functional type	Dorsal topography	Zone				Total[1]
				11	12	13	14	
Other lithic	Conchoidal flake	Utilization only	None	1	2	-	-	3
			Partial cortex	-	-	1	-	1
		None	None	4	15	21	2	42
			Partial cortex	-	1	1	-	2
			Indeterminate	-	-	1	-	1
	Tabular	Tabular knife	None	1	-	-	-	1
			Partial cortex	-	-	1	-	1
		None	None	1	-	-	-	1
			Indeterminate	-	1	1	-	2
	Chunk	Indeterminate	Indeterminate	2	1	8	-	12
		None	None	2	2	1	-	5
			Partial cortex	2	1	2	-	5
			Indeterminate	1	-	5	-	6
	Formed object	Biface	None	-	-	1	-	1
		Chopper	Partial cortex	-	1	-	-	1
		Drill	None	-	-	1	-	1
		Shaft abrader	Indeterminate	1	-	-	-	1
		Bead	None	-	-	2	-	2
		Bifacially retouched flake	None	-	-	1	-	1
		Unifacially retouched flake	Indeterminate	-	1	-	-	1
	Unmodified	Indeterminate	Indeterminate	-	-	1	-	1
	Indeterminate		Indeterminate	2	-	-	-	2
Indeterminate lithic	Conchoidal flake	Tabular knife	Partial cortex	-	-	1	-	1
		None	None	-	2	3	-	5
			Partial cortex	-	1	-	-	1
	Tabular		None	-	1	1	-	2
	Chunk	Indeterminate	None	-	-	-	1	1
		None	Partial cortex	-	1	-	-	1
			Indeterminate	-	1	1	-	2
	Formed object	Projectile point tip	None	-	1	-	-	1
		Bead	None	-	-	6	1	7
		Indeterminate	Partial cortex	-	-	1	-	1
	Unmodified	Tabular knife	Indeterminate	-	1	-	-	1
		Hammerstone	Complete cortex	-	1	-	-	1
	Indeterminate/misc	None	Indeterminate	2	1	-	-	3
TOTAL				911	1,657	4,323	76	6,967

[1] < 1/4 in flakes and non-lithics deleted.

Table 3-11. Material by object type, functional type, dorsal topography, and zone, 45-DO-243.

Material	Object type	Functional type	Dorsal topography	Zone 21	Zone 22	Zone 23	Zone 24	Total[1]
Crytocrystalline silicate	Conchoidal flake	Projectile point base	None	–	1	–	–	1
		Scraper	None	–	1	–	–	1
		Resharpening flake	None	–	2	–	–	2
		Bifacially retouched flake	None	1	–	–	–	1
		Unifacially retouched flake	None	–	4	1	–	5
		Utilization only	None	9	12	3	–	24
			Indeterminate	–	1	–	–	1
		None	None	350	585	360	139	1,434
			Partial Cortex	3	4	1	1	9
			Indeterminate	6	21	8	3	38
	Linear flake	Linear flake	None	2	4	1	1	10
	Tubular	None	None	–	1	1	–	2
	Chunk	Biface	None	–	–	1	–	1
		Core	None	1	1	–	–	2
			Indeterminate	–	1	–	–	1
		Utilization only	None	–	2	2	–	4
		None	None	14	37	19	3	73
			Partial Cortex	1	1	–	–	2
			Indeterminate	1	1	1	2	5
	Core	Biface	None	1	–	–	–	1
	Formed Object	Projectile point	None	3	1	4	1	9
		Projectile point base	None	–	1	–	–	1
		Projectile point tip	None	2	1	1	1	5
		Biface	None	2	5	3	–	10
			Indeterminate	1	1	–	–	2
		Drill	None	–	1	–	–	1
		Scraper	None	1	2	–	2	5
		Bifacially retouched flake	None	1	1	–	–	2
		Unifacially retouched flake	None	1	–	–	–	1
			Indeterminate	–	1	–	–	1
	Indeterminate/ Misc	Utilization only	None	1	1	–	–	2

Table 3-11. Cont'd.

Material	Object type	Functional type	Dorsal topography	Zone 21	Zone 22	Zone 23	Zone 24	Total[1]
Quartzite	Conchoidal flake	Chopper	Partial cortex	–	–	1	–	1
		Tabular knife	None	–	–	–	1	1
		None	None	5	10	–	5	20
			Partial cortex	4	–	2	2	8
	Tabular	Tabular knife	None	1	6	2	–	8
			Partial cortex	–	5	2	–	7
			Complete cortex	1	1	–	1	3
		Indeterminate	None	–	–	1	–	1
		None	None	20	30	22	13	85
			Partial cortex	8	12	12	6	38
			Complete cortex	1	1	4	1	7
	Chunk		Partial cortex	1	–	–	–	1
	Formed object	Tabular knife	Partial cortex	–	3	–	–	3
Fine-grained Quartzite	Conchoidal flake	Bifacially retouched flake	None	–	–	1	–	1
		Utilization only	None	–	1	–	–	1
		None	None	5	7	22	6	40
			Partial cortex	2	–	4	–	6
	Tabular	Utilization only	Complete cortex	–	–	1	–	1
		None	None	–	–	1	1	2
			Complete cortex	–	–	–	1	1
	Chunk		None	1	–	–	–	1
	Formed object	Chopper	Partial cortex	–	–	1	–	1
Basalt	Conchoidal flake	Utilization only	None	–	–	–	2	2
		None	None	14	16	18	27	76
			Partial cortex	1	–	4	–	5
	Core	Chopper	Partial cortex	–	–	–	1	1
	Formed object	Projectile point	None	–	–	–	1	1
		Biface	None	–	–	–	1	1
		Chopper	Partial cortex	–	1	–	1	2
	Unmodified		Partial cortex	–	–	1	–	1
	Indeterminate/ Misc	Utilization only	None	–	1	–	–	1
Granitic	Conchoidal flake	None	None	–	1	–	–	1

Table 3-11. Cont'd.

Material	Object type	Functional type	Dorsal topography	Zone 21	Zone 22	Zone 23	Zone 24	Total[1]
Obsidian			None	10	7	12	4	33
	Chunk		None	-	1	-	-	1
	Formed object	Bifacially retouched flake	None	1	-	-	-	1
Other lithic	Conchoidal flake	Utilization only	None	1	-	-	1	2
		None	None	44	59	70	19	192
			Partial cortex	2	3	2	1	8
			Indeterminate	3	1	5	-	9
	Chunk	Indeterminate	Indeterminate	-	9	-	-	9
		None	None	-	1	1	3	5
	Formed object	Biface	None	-	1	-	1	2
		Chopper	Partial cortex	-	-	-	1	1
		Indeterminate	None	-	-	-	2	2
	Unmodified		Indeterminate	-	1	-	-	1
	Indeterminate		Indeterminate	-	-	2	-	2
Indeterminate lithic	Conchoidal flake	None	None	-	-	-	1	1
			Indeterminate	-	1	-	-	1
	Tabular		None	-	1	-	-	1
	Indeterminate/misc		Indeterminate	1	1	-	-	2
TOTAL				527	875	597	259	2,258

[1] <1/4 in flakes and non-lithics deleted.

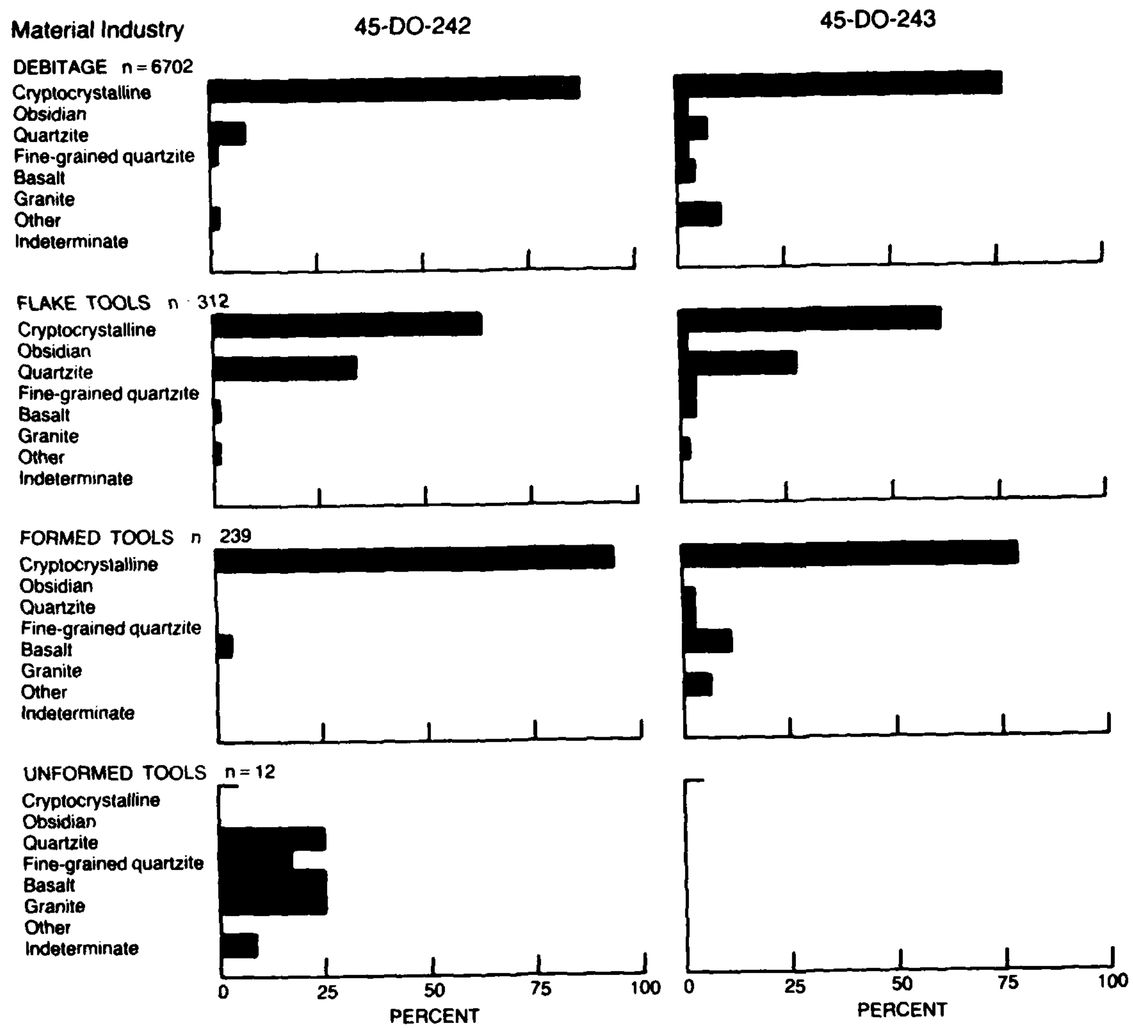


Figure 3-2. Relative percentages of material industries by major manufacturing and tool groups, 45-DO-242 and 45-DO-243.

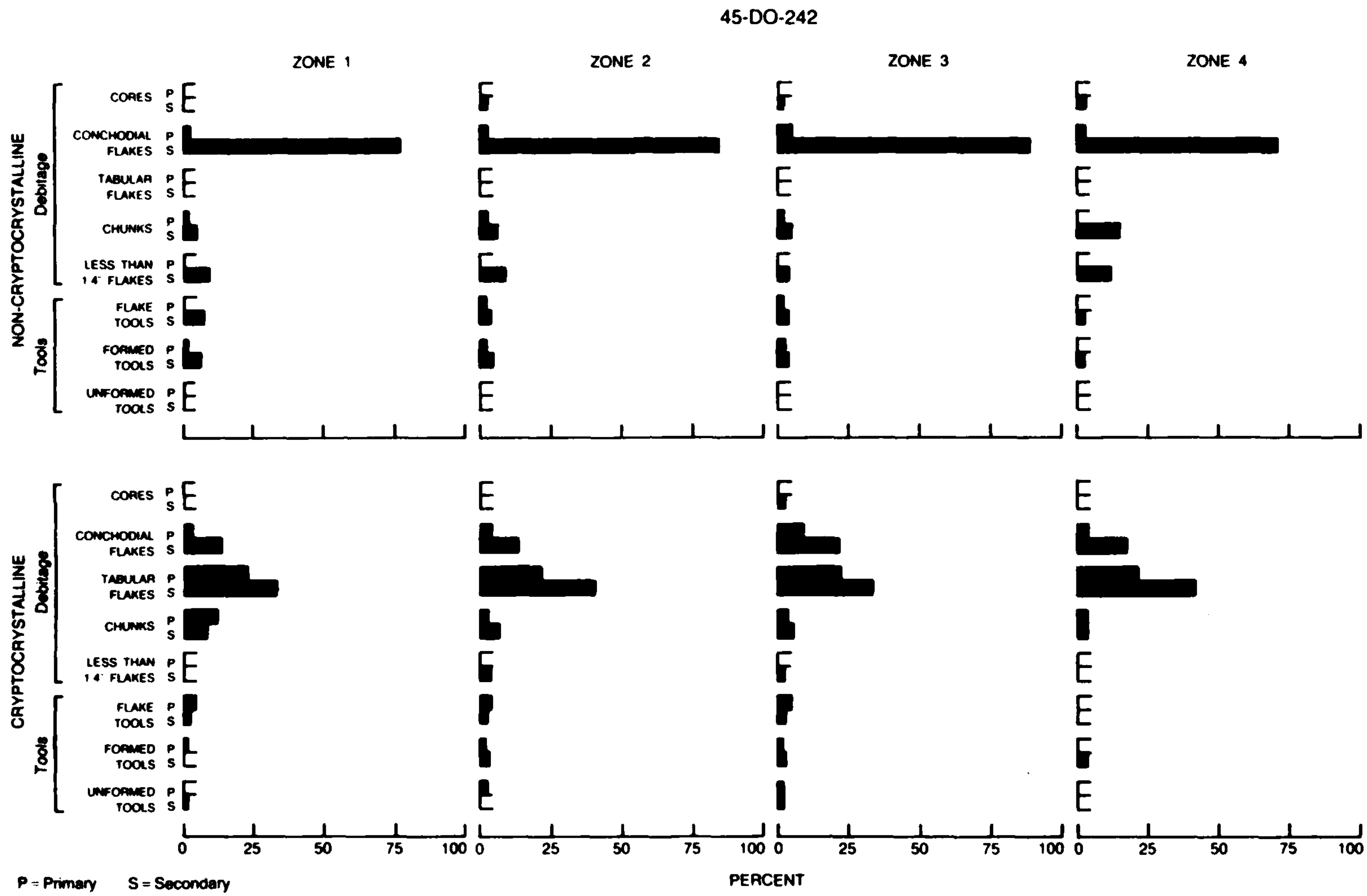


Figure 3-3. Attributes of cryptocrystalline and non-cryptocrystalline industries at 45-DO-242.

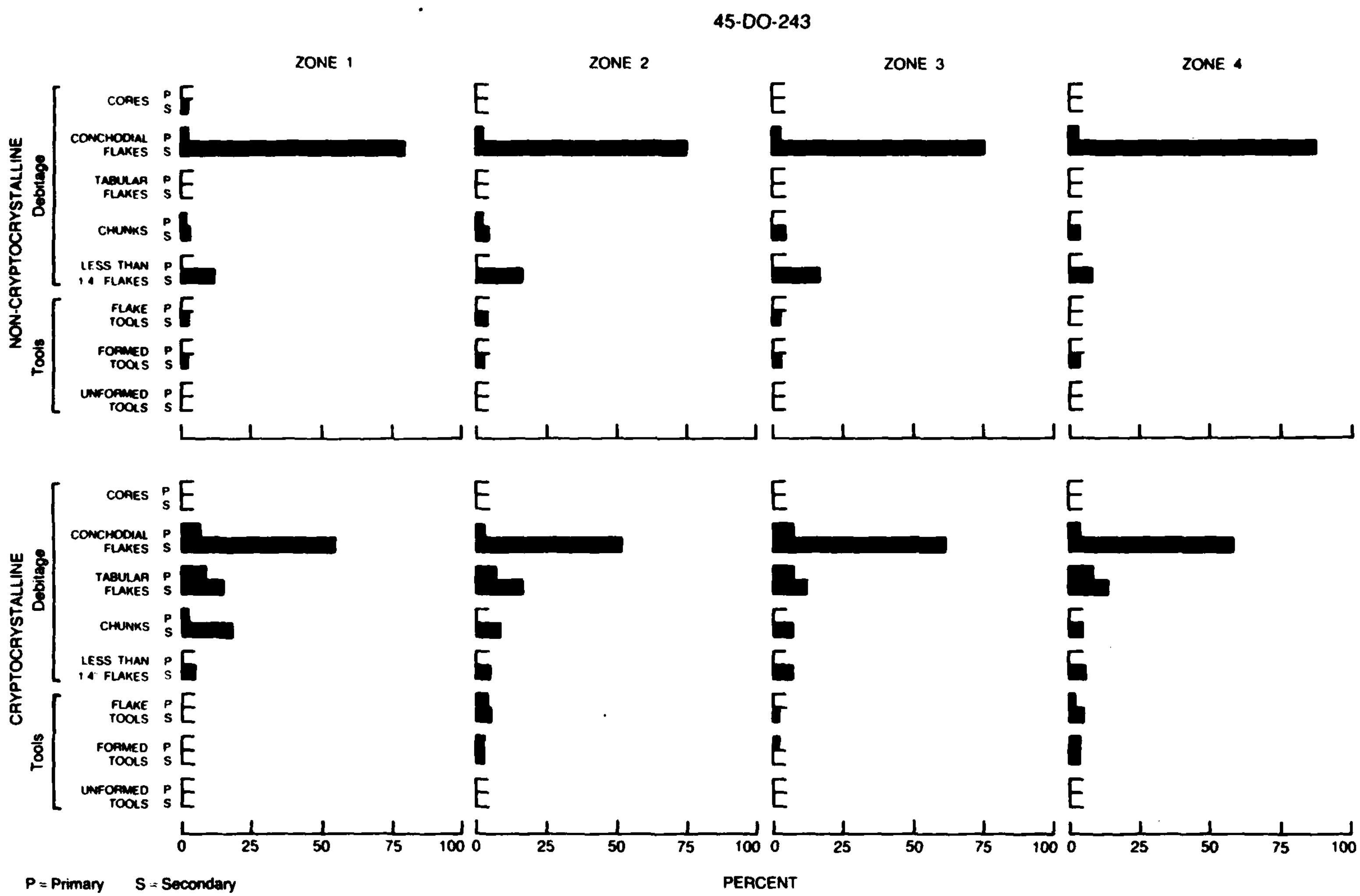


Figure 3-4. Attributes of cryptocrystalline and non-cryptocrystalline Industries at 45-DO-243.

at 45-DO-242. Within the 45-DO-243 tool assemblage, it is also evident that flake tools, formed tools and unformed tools of non-cryptocrystalline stones are not as common as at site 45-DO-242.

In summary, it seems apparent that the most common method of tool production at both 45-DO-242 and 45-DO-243 was a generalized flake tool technology focused on the reduction of imported jasper and chalcedony nodules, cores and flakes for a broad range of functional tool types. Ancillary to this prevalent industry was the reduction of the locally available quartzite cobbles for a limited range of tool forms subsumed under the label of tabular knife. Both methods of tool production are very consistent over the span of occupation at both sites.

FUNCTIONAL ANALYSIS

Functional analysis examines the physical characteristics of artifacts in order to identify patterns of wear diagnostic of specific tool uses. Past research has pointed out the possibility of interpreting tool use by examining edge damage and general attrition of working surfaces (e.g., Hayden 1979; Stafford and Stafford 1979; Keeley 1978, 1974; Odell 1977; Crabtree 1973; Wilmsen 1968, 1970; Frison 1968; Semenov 1964). Wear patterns have been shown to reveal both the manner of tool use and the nature of the materials worked.

All artifacts were examined with a 10X hand-lens (cf. Hayden 1979; Stafford and Stafford 1979). During analysis, each artifact was classified as to tool shape, wear or surface damage, and edge angle. Making use of established correlations between specific wear patterns on certain materials and types of tool use, we can hypothesize the intended and actual use of collected tools. Most distinctions will be based on hardness--on the nature of edge attrition given softer and harder working mediums.

Ten classificatory dimensions are used to describe functional attributes: UTILIZATION-MODIFICATION, TYPE OF MANUFACTURE, MANUFACTURE DISPOSITION, CONDITION OF WEAR, WEAR/MANUFACTURE RELATIONSHIP, KIND OF WEAR, LOCATION OF WEAR, SHAPE OF WORN AREA, ORIENTATION OF WEAR, and EDGE ANGLE. The first five dimensions describe objects, the next four describe tools on objects, and the last describes variation within object/tool types through measurement of the working edges. Table 3-12 outlines these dimensions and constituent attributes.

Description will initially focus on functional object types. Object-specific dimensions will be used to introduce the occurrences of wear on functional object types. Tool-specific dimensions will outline the relationship of wear to manufacture and explicate the kinds of wear observed. Analysis will therefore proceed from the object to examination of tools on the object. Summary tables will deal with tools and the attributes of wear and manufacture which characterize them, rather than with simple descriptions of traditional, formal-functional categories.

Table 3-12. Functional dimensions.

DIMENSION I: UTILIZATION/MODIFICATION

- None
- Wear only
- Manufacture only
- Manufacture and wear
- Modified/indeterminate
- Indeterminate

DIMENSION II: TYPE OF MANUFACTURE

- None
- Chipping
- Pecking
- Grinding
- Chipping and pecking
- Chipping and grinding
- Pecking and grinding
- Chipping, pecking, grinding
- Indeterminate/not applicable

DIMENSION III: MANUFACTURE DISPOSITION

- None
- Partial
- Total
- Indeterminate/not applicable

DIMENSION IV: WEAR CONDITION

- None
- Complete
- Fragment

DIMENSION V: WEAR/MANUFACTURE RELATIONSHIP

- None
- Independent
- Overlapping - total
- Overlapping - partial
- Independent - opposite
- Indeterminate/not applicable

DIMENSION VI: KIND OF WEAR

- Abrasion/grinding
- Smoothing
- Crushing/pecking
- Polishing

DIMENSION VI: Continued

- Feathered chipping
- Feathered chipping/abrasion
- Feathered chipping/smoothing
- Feathered chipping/crushing
- Feathered chipping/polishing
- Hinged chipping
- Hinged chipping/abrasion
- Hinged chipping/smoothing
- Hinged chipping/crushing
- Hinged chipping/polishing
- None

DIMENSION VII: LOCATION OF WEAR

- Edge only
- Unifacial edge
- Bifacial edge
- Point only
- Point and unifacial edge
- Point and bifacial edge
- Point and any combination
- Surface
- Terminal surface
- None

DIMENSION VIII: SHAPE OF WORN AREA

- Not applicable
- Convex
- Concave
- Straight
- Point
- Notch
- Slightly convex
- Slightly concave
- Irregular

DIMENSION IX: ORIENTATION OF WEAR

- Not applicable
- Parallel
- Oblique
- Perpendicular
- Diffuse
- Indeterminate

DIMENSION X: OBJECT EDGE ANGLE

- Actual edge angle

FUNCTIONAL OBJECT TYPES

A total of 687 worn or shaped stone objects were recovered from sites 45-DO-242 (N=552) and 45-DO-243 (N=135) (Table 3-13). These include a range of functional forms encompassing light, piercing and cutting tools, cruder, thicker, cutting and scraping tools, and heavy, chopping and pounding implements. Utilized flakes, unifacially and bifacially retouched flakes, bifaces, tabular knives and projectile points are the most frequent tool forms. Plates 3-1 through 3-5 illustrate selected artifacts from the two sites. Projectile points are illustrated later in the text under Stylistic Analysis. There is a remarkable consistency in the two site assemblages. Utilized and retouched flakes comprise 37.3% of the tool assemblage at 45-DO-242 and 36.3% of the total assemblage at 45-DO-243. Bifaces comprise 14.7% of the assemblage at 45-DO-242 and 12.6% of the assemblage at 45-DO-243. Projectile points make up 18.7% of the assemblage from 45-DO-242 and 12.6% of the assemblage from 45-DO-243. Tabular knives show greater variation, totalling 17.0% of the assemblage at 45-DO-243 and only 8.9% of the assemblage at 45-DO-242. The most significant difference between the two site assemblages, however, is the absence of hammerstones, hopper mortar bases and millingstones at 45-DO-243.

The two site assemblages may be compared by examining attributes of wear and manufacture on the recognized functional tool types. Table 3-14 lists functional types by occurrence of wear and wear/manufacture by analytic zone. As shown, 22.4% (N=144) of the tools from both sites show wear only, 35.5% (N=228) show a combination of wear and manufacture, 32.2% (N=207) have manufacture only, and the rest have either no manufacture or are classified as indeterminate (9.9%, N=63). Simple utilized flakes make up the majority of tool forms with wear only, comprising 24.6% of the total assemblage (N=168). Tool forms with manufacture only are primarily projectile points and projectile point fragments (50.2%, N=104), and bifaces (35.5%, N=73). Wear and manufacture is more evenly distributed across tool categories, but is most frequent in bifaces (11.0%, N=25), scrapers (14.5%, N=33) and tabular knives (30.7%, N=70). As a whole, the recorded tool forms reflect a broad range of potential functions, suggestive of site economies geared largely to hunting-butchering-processing of game, probably supplemented to some degree by plant collection and processing.

Nonlithic artifacts make up a small proportion of the total assemblage (Table 3-13). Because the functional analysis was designed to apply primarily to lithics, the nonlithic artifacts are summarized briefly here but are not discussed in the following sections. Nonutilitarian items include fragments of ochre, a bone bead (Figure 3-5;c), and several pieces of incised bone (Figure 3-5;d-g) among the objects recorded as indeterminate. Formed utilitarian objects include a shuttle (Figure 3-5;b), an awl (Figure 3-5;a), and a billet. Flaked long bones may have single or multiple flake scars on the margins. In some cases the flake scars may be due to fracturing of the long bone shafts with a rock; in other cases they may be due to wear from use of the edge as a tool.

Table 3-13. Functional object type by zone, 45-DO-242 and 45-DO-243.

Object Type	45-DO-242					45-DO-243				
	Zone				Total	Zone				Total
	11	12	13	14		21	22	23	24	
Projectile point	6	12	24	-	42	3	1	4	2	10
Projectile point base	8	6	14	-	29	-	2	-	-	2
Projectile point tip	7	10	15	-	32	2	1	1	1	5
Biface	22	18	41	-	81	4	7	4	2	17
Chopper	1	2	4	-	7	-	1	3	3	7
Drill	2	3	5	-	10	-	1	-	-	1
Graver	-	2	2	-	4	-	-	-	-	-
Scraper	4	8	17	1	30	1	3	-	2	6
Shaft abrader	1	-	-	-	1	-	-	-	-	-
Tabular Knife	10	14	25	-	49	2	15	4	2	23
Bead	-	1	8	1	10	-	-	-	-	-
Hammerstone	1	4	3	-	8	-	-	-	-	-
Hopper mortar base	-	1	-	-	1	-	-	-	-	-
Millingstone	-	1	2	-	3	-	-	-	-	-
Burin spall	-	1	-	-	1	-	-	-	-	-
Linear flake	3	2	7	-	12	2	4	-	4	10
Core	-	2	3	1	6	1	2	-	-	3
Resharpening flake	1	1	2	-	4	-	2	-	-	2
Bifacially retouched flake	7	3	10	-	20	3	1	1	-	5
Unifacially retouched flake	17	10	23	-	50	1	4	1	-	6
Utilization only	26	30	75	1	132	11	17	5	3	36
Indeterminate	4	1	13	1	20	-	10	1	2	13
TOTAL LITHIC	121	132	283	5	55?	29	61	24	21	135
NONLITHICS										
Shuttle	-	-	1	-	1	-	-	-	-	-
Awl	-	-	1	-	1	-	-	1	-	1
Billet	-	-	1	-	1	-	-	-	-	-
Flaked long bone	-	1	5	1	7	-	-	-	-	-
Bead	3	1	-	-	4	-	-	-	-	-
Indeterminate bone	4	4	29	1	38	-	3	2	2	7
Ochre	-	2	-	-	2	-	-	-	-	-
TOTAL NONLITHICS	7	8	37	2	54	-	3	3	2	8

KEY

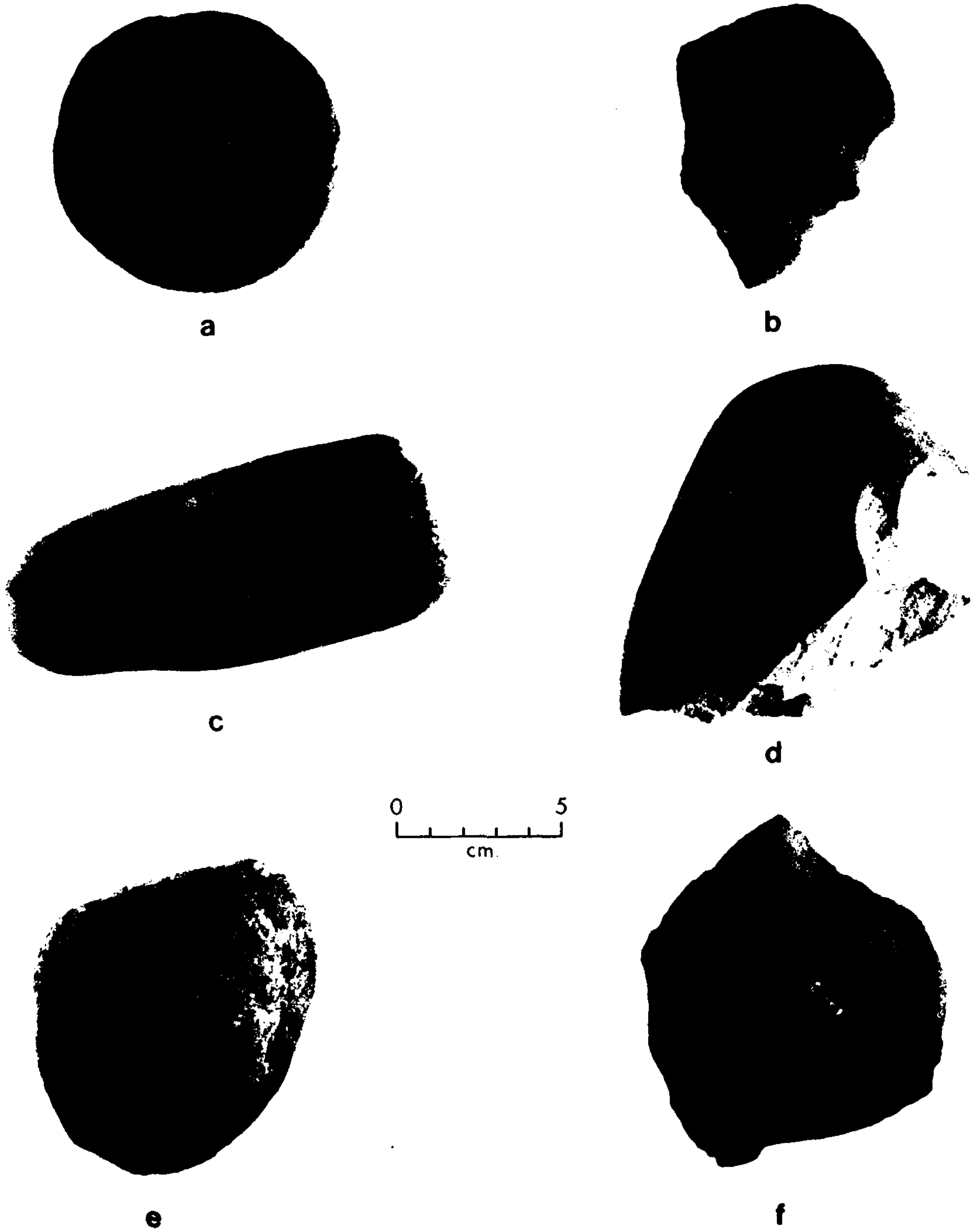
Master number:
Tool:
Provenience/Level:
Zone:
Material:

a.	b.
22	89
Edge ground pebble	Chopper
Test Pit 2/160A	4N18W/FE21/50
Not known	2
Indeterminate	Fine-grained basalt

c.	d.
463	275
Hammerstone	Chopper
2N22W/70	1N41W/110
2	3
Fine-grained quartzite	Coarse-grained quartzite

e.	f.
570	253
Hammerstone	Core
1N27W/FE37/165	2N42W/FE8/220
3	3
Coarse-grained quartzite	Basalt

Plate 3-1. Cobble tools, 45-DO-242.


a
b
c
d
0
5
cm.
e
f

KEY
Master number:
Tool:
Provenience/Level:
Zone:
Material:

a.
135
Tabular knife
1N35W/40
1
Basalt

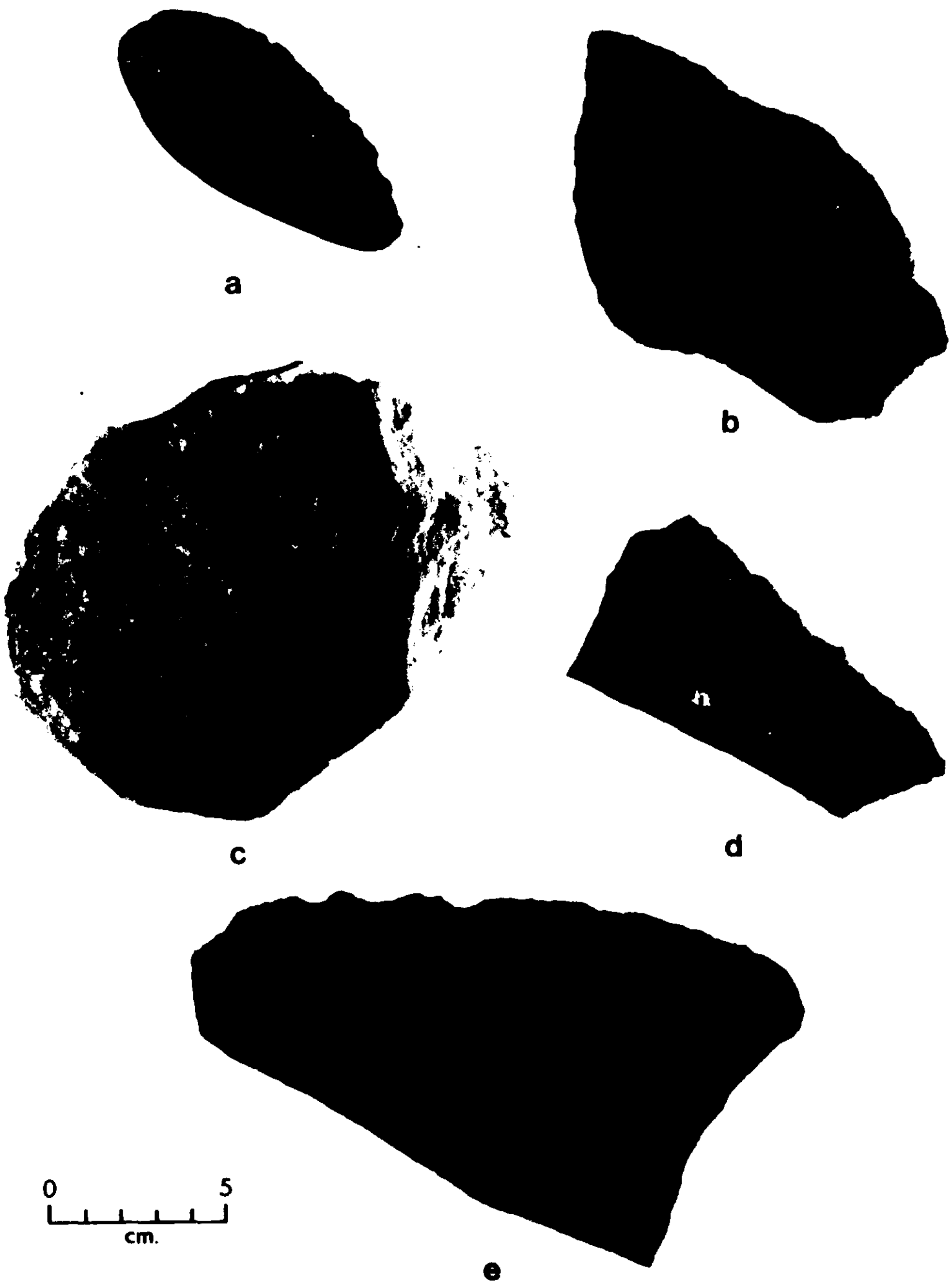
b.
98
Tabular knife
4N17W/30
1
Basalt

c.
24
Tabular knife
Test Pit 2/170A
2
Quartzite

d.
91
Tabular knife
4N18W/FE21/50
2
Indeterminate

e.
447
Tabular knife
0N28W/FE23/170
3
Basalt

Plate 3-2. Tabular knives, 45-DO-242.


a
b
c
d
e
0
5
cm.

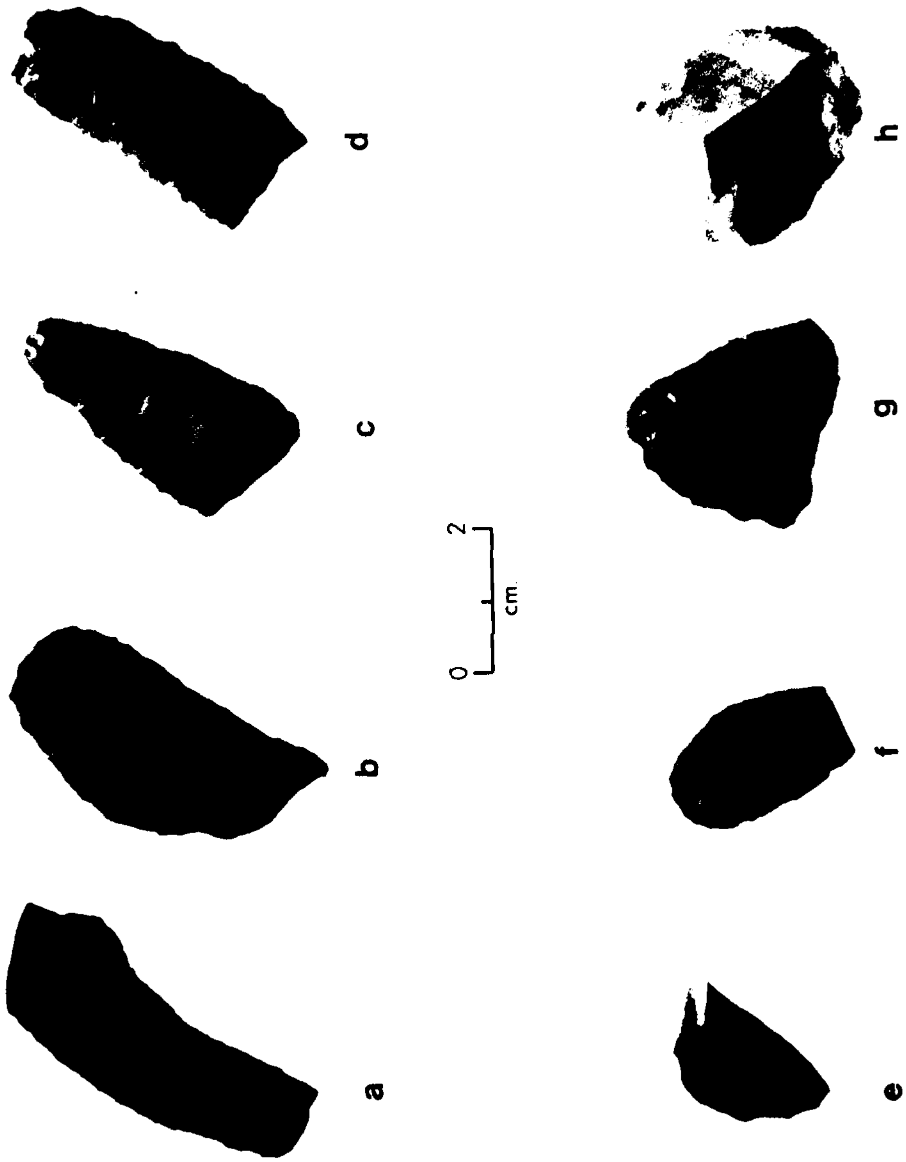
KEY

Site number:
Master number:
Tool:
Provenience/Level:
Zone:
Material:

a.	b.	c.	d.
45-DO-242	45-DO-242	45-DO-243	45-DO-242
395	307	97	446
Scraper	Scraper	Scraper	Scraper
3N6W/FE4/60	2N51W/FE8/50	10N21W/60	0N28E/FE23/170
2	3	4	3
Jasper	Jasper	Jasper	Jasper

e.	f.	g.	h.
45-DO-243	45-DO-243	45-DO-242	45-DO-242
105	184	442	519
Scraper	Scraper	Scraper	Scraper
8N10W/190	8N18W/50	0N28W/30	2N27W/FE13/UL10
4	2	1	1
Jasper	Opal	Jasper	Jasper

Plate 3-3. Scrapers, 45-DO-242 and 45-DO-243.


a
b
c
d
e
f
g
h
0
2
cm

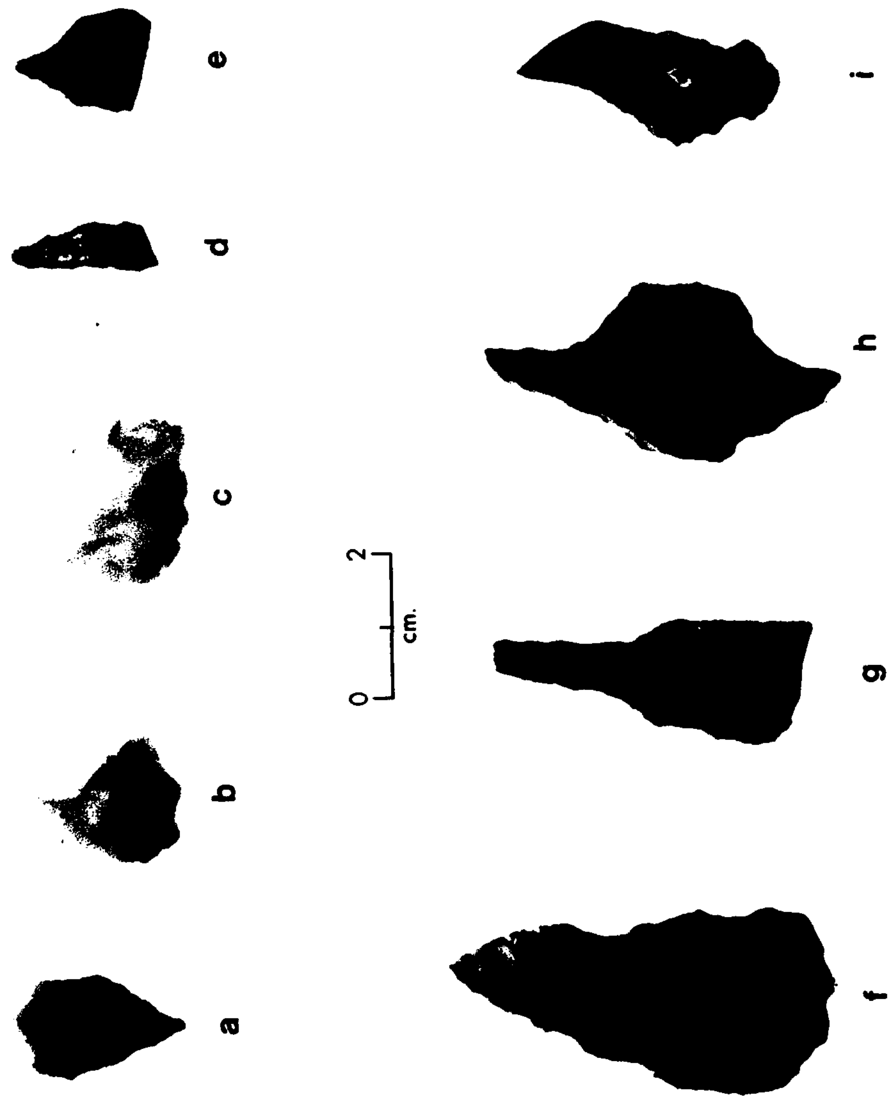
KEY

Site number:
Master number:
Tool:
Provenience/Level:
Zone:
Material:

a.	b.	c.	d.	e.
45-DO-242	45-DO-242	45-DO-242	45-DO-242	45-DO-242
10	15	25	265	492
Graver	Graver	Graver	Graver	Graver
Test Pit 2/50A	Test Pit 2/50A	Surface	2N31W/FE8/50	2N23W/70
2	1	1	3	2
Cryptocrystalline silicate	Cryptocrystalline silicate	Chalcedony	Jasper	Chalcedony

f.	g.	h.	i.
45-DO-242	45-DO-242	45-DO-243	45-DO-242
571	137	127	276
Drill	Drill	Drill	Drill
1N27W/FE37/170	1N35W/50	9N3E/40	1N3W/20
3	2	2	2
Silicized mudstone	Jasper	Jasper	Jasper

Plate 3-4. Gravers and drills, 45-DO-242 and 45-DO-243.


a
b
c
d
e
f
g
h
i
0
2
cm.

KEY

Site number:
Master number:
Tool:
Provenience/Level:
Zone:
Material:

	Site number	Master number	Tool	Provenience/Level	Zone	Material
a.	45-DO-243	95	Core	10N2W/60	2	Jasper
b.	45-DO-243	111	Core	6N12W/50	1	Jasper
c.	45-DO-243	60	Core	6N21W/60	2	Jasper
d.	45-DO-242	604	Bead	2N29W/FE23/175	3	Indeterminate
e.	45-DO-242	603	Bead	2N29W/FE37/170	3	Indeterminate
f.	45-DO-242	329	Bead	3N41W/FE33/180	3	Indeterminate
g.	45-DO-242	468	Bead	2N21W/70	2	Coarse-grained quartzite
h.	45-DO-243	184	Tube bead	8N18W/50	3	Bone
i.	45-DO-242	622	Bead	4N25W/FE10/150	3	Steatite
j.	45-DO-242	604	Bead	2N29W/FE23/175	3	Indeterminate
k.	45-DO-242	80	Bead	2N22W/80	2	Bone/Antler
l.	45-DO-242	254	Bead	2N4W/FE8,18/230	3	Indeterminate
m.	45-DO-242	585	Bead	2N30W/110	3	Indeterminate
n.	45-DO-242	323	Bead	3N4W/FE8/180	3	Indeterminate
o.	45-DO-242	588	Bead	2N30W/175	3	Indeterminate

Plate 3-5. Cores and beads, 45-DO-242 and 45-DO-243.


0
2
cm.
a
b
c
d
e
f
g
h
i
j
k
m
n
o
p

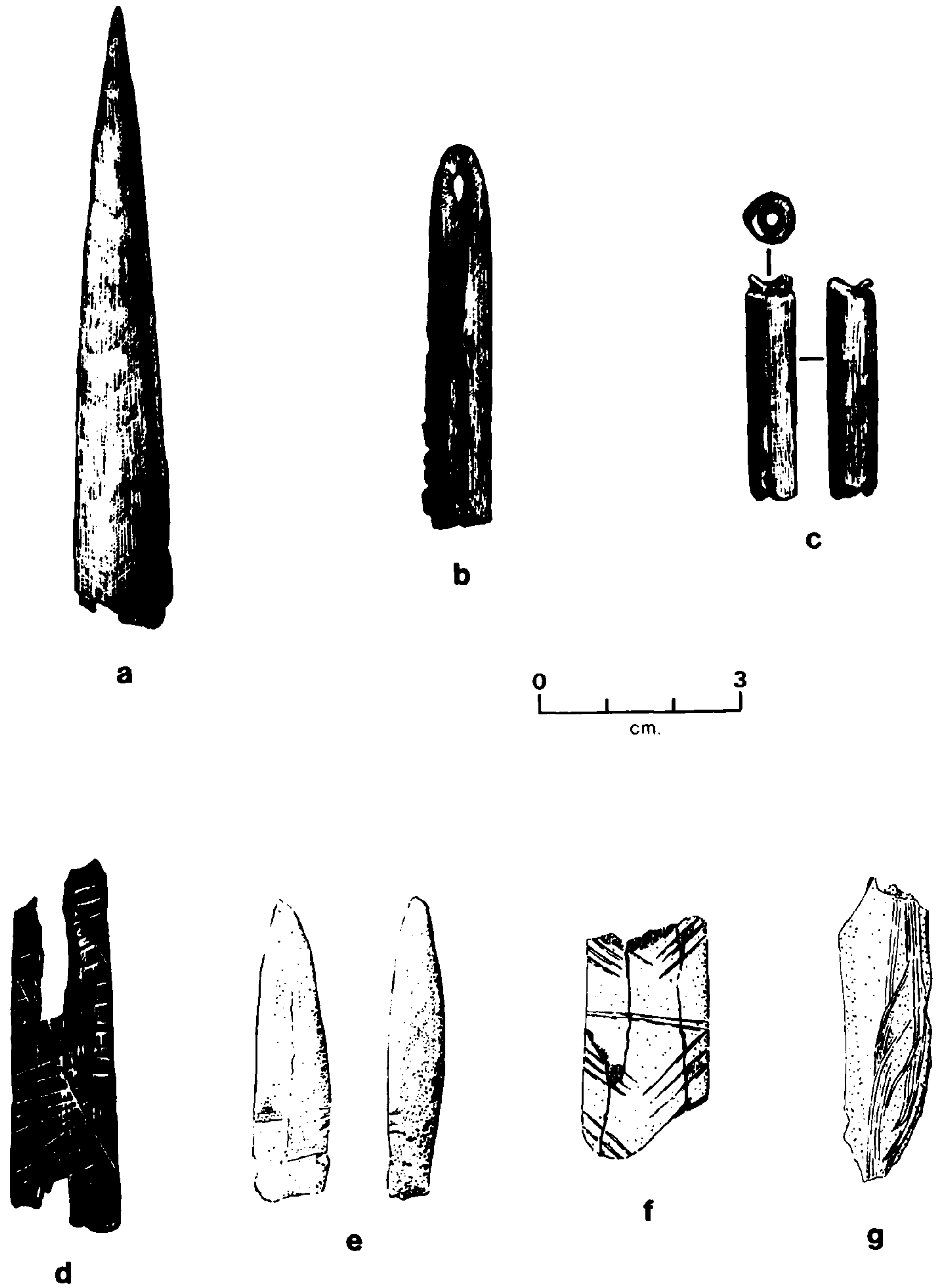
KEY

Site Number:
Master Number:
Provenience:
Zone:
Tool Type:

a.	b.	c.
45-DO-242	45-DO-242	45-DO-242
49	653	184
1N2E/50/F24	5N31W/100/F15	6N31W/20/F41
3	3	1
Awl	Shuttle	Bead

d.	e.	f.	g.
45-DO-243	45-DO-243	45-DO-242	45-DO242
178	185	410	420
11N20E/50	8N18E/120	3N5W/20/F2	3N5W/130/F8
2	3	1	3
Indeterminate	Indeterminate	Indeterminate	Indeterminate

Figure 3-5. Examples of nonlithic artifacts, 45-DO-242 and 45-DO-243.


a
b
c
0
3
cm.
d
e
f
g

WEAR PATTERNS

Many of the 687 stone objects have more than one area of wear, that is, more than one tool (24.8%, N=137, 45-DO-242; 27.1%, N=41, 45-DO-243) (Table 3-15). The highest wear area object ratios were observed on scrapers (2.43), gravers (2.00), and drills (1.90) at 45-DO-242, and on drills (4.00) at 45-DO-243. Those functional types in a middle range include hammerstones (1.75), tabular knives (1.43), utilized flakes (1.39) and unifacially retouched flakes (1.22) at 45-DO-242, and choppers (1.71), tabular knives (1.64), bifacially retouched flakes (1.60), utilized flakes (1.48) and scrapers (1.33) at 45-DO-243. The lowest ratios were recorded for bifacially retouched flakes (.90), choppers (.71), bifaces (.36) and projectile points (.20) at 45-DO-242, and for bifaces (.82) and unifacially retouched flakes (.57) at 45-DO-243. Tool forms with the largest range of defined wear areas at 45-DO-242 include utilized and retouched flakes (0-5), tabular knives (0-5), scrapers (0-5) and drills (0-5). At 45-DO-243, tools with the largest range include utilized and retouched flakes (0-4), choppers (0-4), tabular knives (0-3), bifaces (0-3) and scrapers (0-3).

Obvious differences between the two site assemblages include lower wear area/object ratios for scrapers and unifacially retouched flakes at 45-DO-243 than at 45-DO-242, and markedly higher wear area object ratios for choppers at 45-DO-243 than for choppers at 45-DO-242. The lower frequencies of scrapers and unifacially retouched flakes at 45-DO-242 than at 45-DO-243 may explain these discrepancies. In general, those functional types with comparable proportions within zonal assemblages tend to have similar wear area object ratios, indicative of similar patterns of tool use. The single exception to that statement is the chopper category, of which both sites have equal, though small frequencies; yet choppers in the lower three zones at 45-DO-243 show a pattern of more intensive use or a very different kind of use.

We can conclude that although simple utilized flakes were the most frequent tool form with wear at both sites, and were intensively utilized, other tool forms such as drills, gravers, scrapers, choppers and hammerstones saw equally intensive use and reuse.

Figures 3-6 and 3-7 illustrate the relationship of types of wear to defined functional types. Tables 3-16 and 3-17 describe these correlations in detail. Most obvious is the rough correspondence between functional types with implicitly associated uses and wear types indicative of those kinds of uses (e.g., smoothing wear on the edges, unifacial and bifacial edges, and points of drills; crushing wear on edges and surfaces of choppers and hammers; feathered and hinged chipping wear on the unifacial and bifacial edges and points of small flaked tool forms). If we make finer distinctions, however, we discover discrepancies between implied and actual tool uses. For instance, projectile points show smoothing, feathered chipping, and hinged chipping wear on edges, unifacial edges, and bifacial edges, reflecting use as general purpose cutting and scraping tool forms rather than as simple perforating implements. Scrapers show proportionately more feathered and hinged chipping on unifacial and bifacial edges than smoothing on unifacial edges, which indicates hard use on a variety of materials, and certainly not use confined

Table 3-14. Attributes of wear and manufacture of functional object types by zone, 45-DO-242 and 45-DO-243.

Functional Object Type	UM[1]	TM[2]	45-DO-242 Zone 11	45-DO-242 Zone 12	45-DO-242 Zone 13	45-DO-242 Zone 14	45-DO-243 Zone 21	45-DO-243 Zone 22	45-DO-243 Zone 23	45-DO-243 Zone 24	Total
Projectile point	3	2	5	9	20	-	3	1	4	2	44
	4	2	-	3	4	-	-	-	-	-	7
	5	9	1	-	-	-	-	-	-	-	1
Projectile point base	3	2	9	6	11	-	-	2	-	-	28
	4	2	-	-	3	-	-	-	-	-	3
Projectile point tip	3	2	7	8	12	-	2	1	1	1	32
	4	2	-	2	3	-	-	-	-	-	5
Biface	3	2	22	13	28	-	2	4	3	1	73
	4	2	-	5	13	-	2	3	1	1	25
Chopper	3	2	-	1	1	-	-	-	1	-	3
	4	2	1	1	3	-	-	1	2	3	11
Drill	2	1	-	1	-	-	-	-	-	-	1
	4	2	2	2	5	-	-	1	-	-	10
Graver	4	2	-	2	2	-	-	-	-	-	4
Scraper	3	2	-	1	1	-	-	1	-	-	3
	4	2	4	7	16	1	1	2	-	2	33
Shaft abrader	5	9	1	-	-	-	-	-	-	-	1
Tabular knife	3	2	-	1	-	-	-	-	1	-	2
	4	2	10	13	25	-	2	15	3	2	70
Bead	5	9	-	1	8	1	-	-	-	-	10
Hammerstone	2	1	1	4	3	-	-	-	-	-	8
Hopper mortar	2	1	-	1	-	-	-	-	-	-	1
Millingstone	2	1	-	1	1	-	-	-	-	-	2
	5	9	-	-	1	-	-	-	-	-	1
Burin spall	3	2	-	1	-	-	-	-	-	-	1
Linear flake	1	1	3	2	7	-	2	4	-	4	22
Core	1	1	-	2	3	1	1	2	-	-	9
Resharpening flake	3	2	-	-	1	-	-	2	-	-	3
	4	2	1	1	1	-	-	-	-	-	3
Bifacially retouched flake	3	2	5	1	6	-	-	-	1	-	13
	4	2	2	2	4	-	3	1	-	-	12
Unifacially retouched flake	3	2	2	-	3	-	1	4	1	-	11
	4	2	15	10	20	-	-	-	-	-	45
Utilized flake	2	1	26	30	75	1	11	17	5	3	168
Indeterminate	5	9	4	1	12	1	-	-	-	-	18
	6	9	-	-	1	-	-	-	-	-	1
TOTAL			121	132	293	5	18	40	17	16	682

[1]Utilization-modification

1. None
2. Wear only
3. Manufacture only
4. Manufacture and wear
5. Modified/indeterminate
6. Indeterminate

[2]Type of manufacture

1. None
2. Chipping
3. Pecking
4. Grinding
5. Chipping and pecking
6. Chipping and grinding
7. Pecking and grinding
8. Chipping/pecking/grinding
9. Not applicable/indeterminate

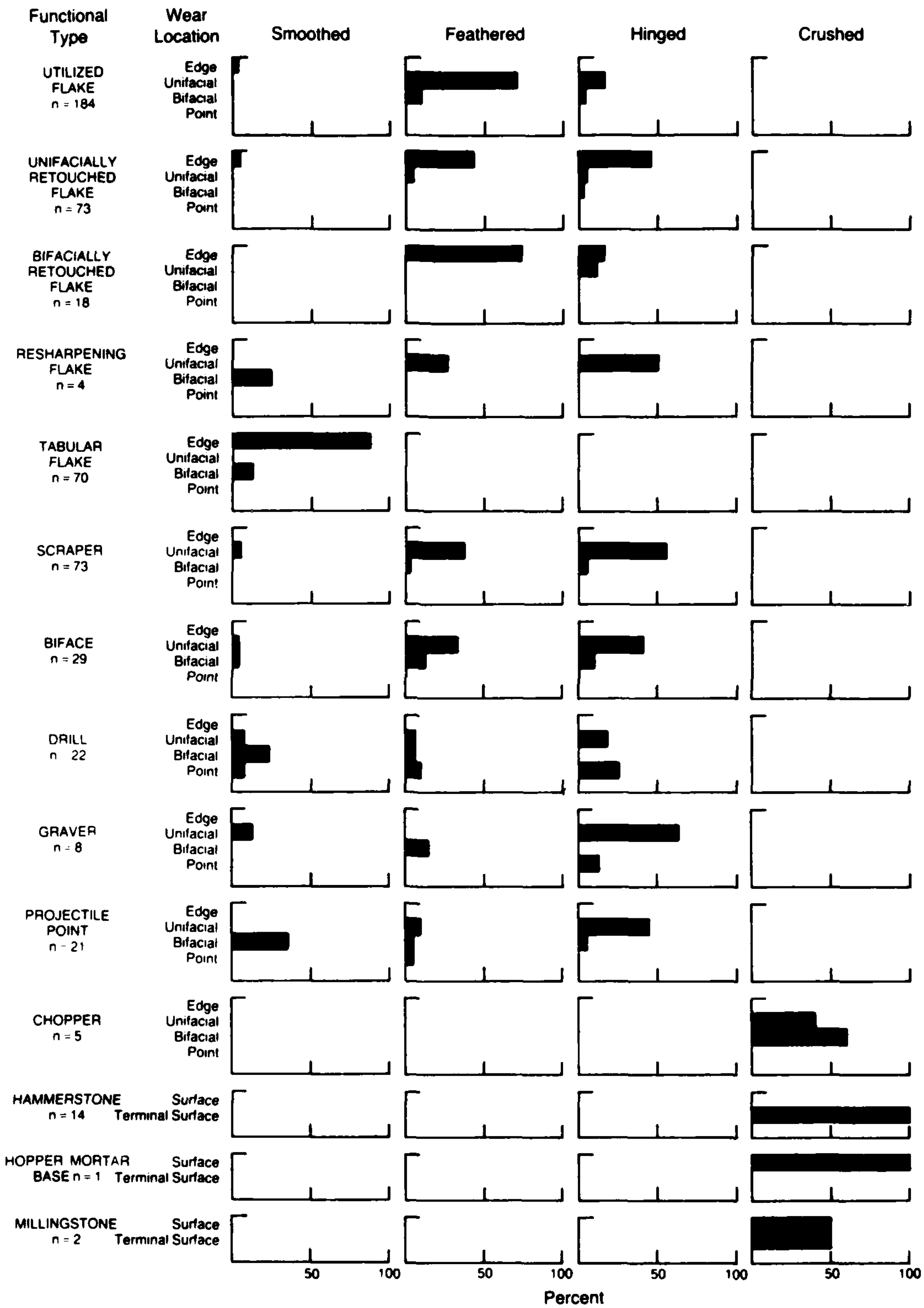


Figure 3-6. Relationship of wear types to functional types, 45-DO-242.

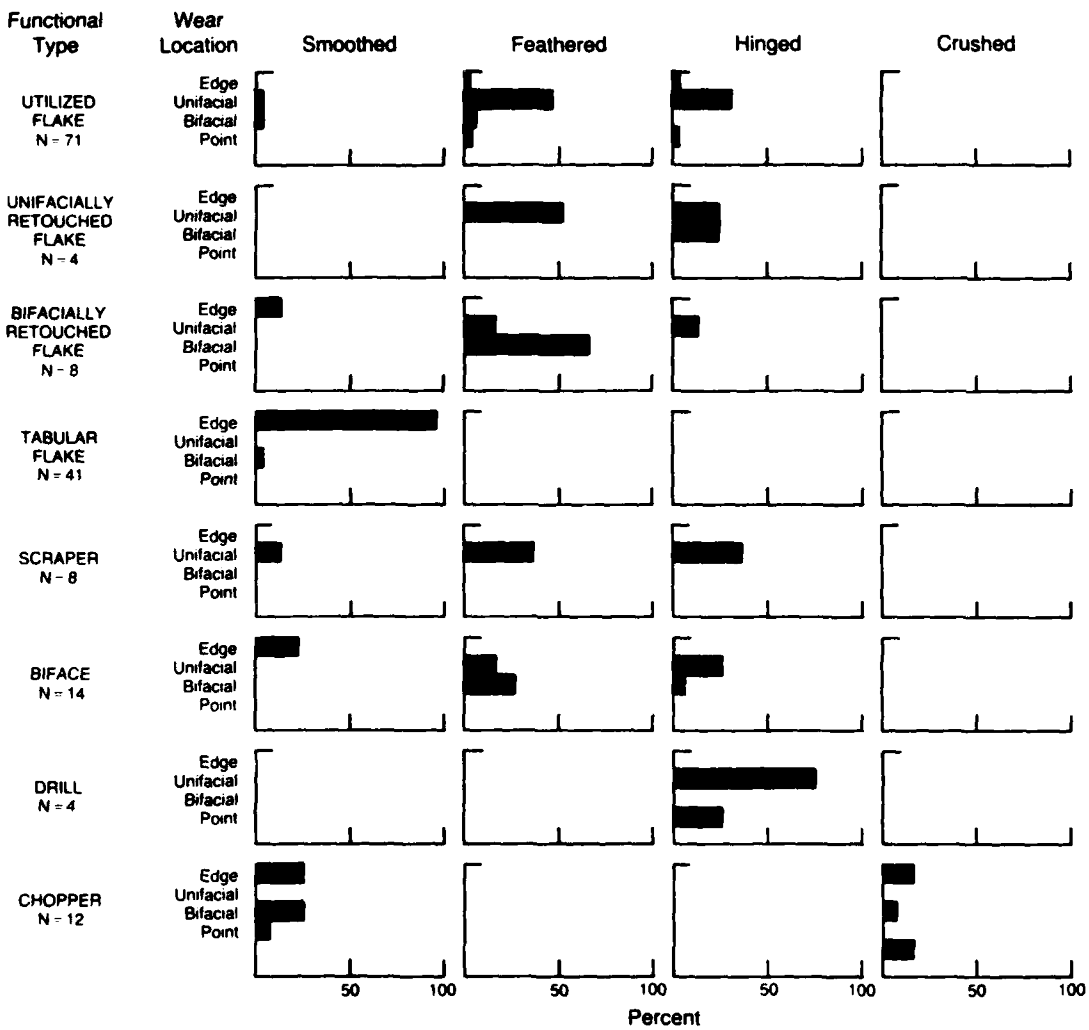


Figure 3-7. Relationship of wear types to functional types, 45-DO-243.

Table 3-15. Frequency of worn areas by functional type, 45-DO-242 and 45-DO-243.

Functional Type	Number of Wear Areas	45-DO-242 Total		45-DO-243 Total	
		Freq	Ratio	Freq	Ratio
Utilized flake	1	94	184/132	33	71/48
	2	28	=1.39	9	=1.48
	3	7		4	
	4	1		2	
	5	1		-	
Unifacially retouched flake	0	5	96/72	4	4/7
	1	42	=1.33	2	=.57
	2	22		1	
	3	2		-	
	4	1		-	
Bifacially retouched flake	0	12	18/20	1	8/5
	1	2	=.90	1	=1.60
	2	3		2	
	3	2		1	
	4	1		-	
Resharpening flake	0	1	4/4	2	0/2
	1	2	=1.00	-	=0.00
	2	1		-	
Linear flake	0	12	0/12	10	0/10
			=0.00		=0.00
Tabular knife	0	1	70/49	1	41/25
	1	33	=1.43	12	=1.64
	2	10		7	
	3	4		5	
	5	1		-	
Biface	0	83	29/81	10	14/17
	1	9	=.36	3	=.82
	2	7		1	
	3	2		3	
Scraper	0	2	73/30	1	8/6
	1	5	=2.43	3	=1.33
	2	9		1	
	3	8		1	
	4	4		-	
	5	2		-	

Functional Type	Number of Wear Areas	45-DO-242 Total		45-DO-243 Total	
		Freq	Ratio	Freq	Ratio
Burin spall	0	1	0/1	-	
			=0.00		
Drill	1	3	19/10	-	4/1
	2	4	=1.90	-	=4.00
	3	2		-	
	4	-		1	
	5	1		-	
Graver	1	1	8/4	-	
	2	2	=2.00	-	
	3	1		-	
Projectile point[2]	0	88	21/103	17	0/17
	1	10	=.20	-	=0.00
	2	4		-	
	3	1		-	
Chopper	0	2	5/7	1	12/7
	1	5	=.71	2	=1.71
	2	-		3	
	4	-		1	
Core	0	6	0/6	3	0/3
			=0.00		=0.00
Hammerstone	1	3	14/8	-	
	2	4	=1.75	-	
	3	1		-	
Hopper mortar base	1	1	1/1	-	
			=1.00		
Millingstone	1	2	1/2	-	
			=.50		
Bead	0	10	0/10	-	
			=0.00		
Shaft abrader	0	1	0/1	-	
			=0.00		
Indeterminate	0	18	0/18	14	1/15
	1	-	=0.00	1	=.07
TOTAL		551		151	

[1] Non-lithics deleted.
[2] Projectile point includes complete points, point bases, and point tips.

Table 3-16. Distribution of tool types by zone, 45-DO-242.

Tool type	Zone 11 N	Zone 11 Col%/T%	Zone 12 N	Zone 12 Col%/T%	Zone 13 N	Zone 13 Col%/T%	Zone 14 N	Zone 14 Col%/T%	Total N	Total Col%/T%
Utilized flakes										
Smoothing-unifacial	2	05/02	-	00/00	-	00/00	-	00/00	2	01/00
Feathered-unifacial	20	54/20	22	59/16	83	79/29	4	100/44	129	70/25
Feathered-bifacial	7	19/07	5	13/04	5	05/02	-	00/00	17	09/03
Hinged-unifacial	8	22/08	8	21/06	15	14/05	-	00/00	31	17/06
Hinged-bifacial	-	00/00	3	08/02	2	02/01	-	00/00	5	03/01
Unifacially retouched flakes										
Smoothing-unifacial	2	08/02	1	05/01	-	00/00	-	00/00	3	04/00
Feathered-unifacial	9	36/09	6	31/04	15	52/05	-	00/00	30	41/06
Feathered-bifacial	1	04/01	1	05/01	1	03/00	-	00/00	3	04/00
Hinged-unifacial	11	44/11	8	42/06	13	45/05	-	00/00	32	44/06
Hinged-bifacial	1	04/01	3	16/02	-	00/00	-	00/00	4	05/01
Hinged-point	1	04/01	-	00/00	-	00/00	-	00/00	1	01/00
Bifacially retouched flakes										
Feathered-unifacial	4	80/04	3	75/02	6	67/02	-	00/00	13	72/02
Hinged-unifacial	1	20/01	-	00/00	2	22/01	-	00/00	3	17/00
Hinged-bifacial	-	00/00	1	25/01	1	11/00	-	00/00	2	11/00
Resharpening flake										
Smoothing-bifacial	-	00/00	-	00/00	1	50/00	-	00/00	1	25/00
Feathered-unifacial	-	00/00	-	00/00	1	50/00	-	00/00	1	25/00
Hinged-unifacial	1	100/01	1	100/01	-	00/00	-	00/00	2	50/00
Tabular knife										
Smoothing-edge	8	67/08	19	100/14	39	100/14	-	00/00	66	94/12
Smoothing-bifacial	4	33/04	-	00/00	-	00/00	-	00/00	4	06/01
Scraper										
Smoothing-unifacial	2	22/02	-	00/00	3	07/01	-	00/00	5	07/01
Feathered-unifacial	1	11/01	8	50/06	18	37/06	1	20/11	28	36/05
Feathered-bifacial	-	00/00	1	06/01	-	00/00	-	00/00	1	01/00
Hinged-unifacial	6	67/06	7	44/05	22	51/08	4	80/44	39	53/07
Hinged-bifacial	-	00/00	-	00/00	2	05/01	-	00/00	2	03/00
Biface										
Smoothing-unifacial	-	00/00	1	11/01	-	00/00	-	00/00	1	03/00
Smoothing-bifacial	-	00/00	1	11/01	-	00/00	-	00/00	1	03/00
Feathered-unifacial	-	00/00	1	11/01	8	40/03	-	00/00	9	31/02
Feathered-bifacial	-	00/00	1	11/01	2	10/01	-	00/00	3	10/00
Hinged-unifacial	-	00/00	5	55/04	7	15/02	-	00/00	12	41/02
Hinged-bifacial	-	00/00	-	00/00	3	15/01	-	00/00	3	10/00

AD-A160 949 ARCHAEOLOGICAL INVESTIGATIONS AT SITES 45-DO-242 AND 45-DO-243 CHIEF JOSEPH DAM PROJECT WASHINGTON(U) WASHINGTON UNIV SEATTLE E S LOHSE ET AL. 1984 2/3

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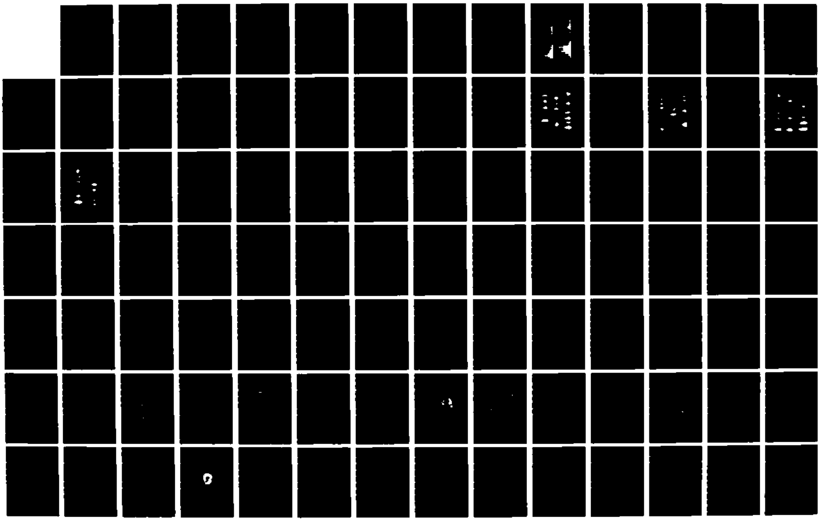

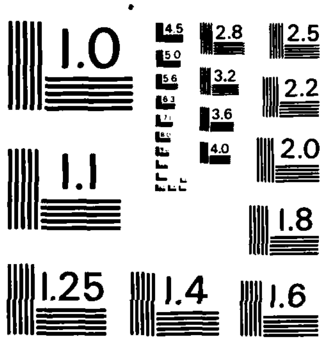

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Table 3-16. Cont'd.

Tool type	Zone								Total	
	11		12		13		14			
	N	Col%/T%	N	Col%/T%	N	Col%/T%	N	Col%/T%	N	Col%/T%
Drill										
Smoothing-unifacial	1	17/01	1	12/01	-	00/00	-	00/00	2	08/00
Smoothing-bifacial	3	50/03	2	25/01	-	00/00	-	00/00	5	23/01
Smoothing-point	1	17/01	1	12/01	-	00/00	-	00/00	2	08/00
Feathered-unifacial	-	00/00	-	00/00	1	12/00	-	00/00	1	04/00
Feathered-bifacial	-	00/00	1	12/01	-	00/00	-	00/00	1	04/00
Feathered-point	1	17/01	-	00/00	1	12/00	-	00/00	2	08/00
Hinged-unifacial	-	00/00	2	25/01	2	25/01	-	00/00	4	18/01
Hinged-bifacial	-	00/00	1	12/01	4	50/01	-	00/00	5	23/01
Graver										
Smoothing-point	-	00/00	1	20/01	-	00/00	-	00/00	1	12/00
Feathered-bifacial	-	00/00	1	20/01	-	00/00	-	00/00	1	12/00
Hinged-unifacial	-	00/00	3	60/02	2	67/01	-	00/00	5	62/01
Hinged-point	-	00/00	-	00/00	1	33/00	-	00/00	1	12/00
Projectile point										
Smoothing-bifacial	-	00/00	2	28/01	5	38/02	-	00/00	7	33/01
Feathered-unifacial	-	00/00	1	14/01	1	07/00	-	00/00	2	08/00
Feathered-bifacial	-	00/00	-	00/00	1	07/00	-	00/00	1	05/00
Feathered-point	-	00/00	-	00/00	1	07/00	-	00/00	1	05/00
Hinged-unifacial	-	00/00	3	43/02	6	43/02	-	00/00	9	43/02
Hinged-bifacial	-	00/00	1	14/01	-	00/00	-	00/00	1	05/00
Chopper										
Crushed-unifacial	-	00/00	-	00/00	2	67/01	-	00/00	2	40/00
Crushed-bifacial	1	100/00	1	100/01	1	33/00	-	00/00	3	60/00
Hammerstone										
Crushed-terminal surface	2	100/02	6	100/04	6	100/02	-	00/00	14	100/03
Hopper mortar base										
Crushed-surface	-	00/00	1	100/01	-	00/00	-	00/00	1	100/00
Millingstone										
Crushed-surface	-	00/00	-	00/00	1	100/00	-	00/00	1	50/00
Crushed-terminal surface	-	00/00	1	100/01	-	00/00	-	00/00	1	50/00
TOTAL	98		135		282		9		524	

Table 3-17. Distribution of tool types by zone, 45-DO-243.

Tool Type	Zone 21 N	Zone 21 Col%/T%	Zone 22 N	Zone 22 Col%/T%	Zone 23 N	Zone 23 Col%/T%	Zone 24 N	Zone 24 Col%/T%	Total N	Total Col%/T%
Utilized flakes										
Smoothing-unifacial	1	05/03	-	00/00	1	10/05	-	00/00	2	03/01
Smoothing-bifacial	-	00/00	2	08/03	-	00/00	-	00/00	2	03/01
Feathered-edge	-	00/00	1	04/01	-	00/00	-	00/00	1	02/01
Feathered-unifacial	13	62/34	12	46/17	-	00/00	4	100/22	29	47/20
Feathered-bifacial	1	05/03	3	11/04	-	00/00	-	00/00	4	06/03
Feathered-point	-	00/00	1	04/01	1	10/05	-	00/00	2	03/01
Hinged-edge	-	00/00	-	00/00	1	10/05	-	00/00	1	02/01
Hinged-unifacial	6	28/16	7	27/10	6	60/28	-	00/00	19	31/13
Hinged-point	-	00/00	-	00/00	1	10/05	-	00/00	1	02/01
Unifacially retouched flakes										
Feathered-unifacial	-	00/00	2	67/03	-	00/00	-	00/00	2	50/01
Hinged-unifacial	-	00/00	1	33/01	-	00/00	-	00/00	1	25/01
Hinged-bifacial	-	00/00	-	00/00	1	100/05	-	00/00	1	25/01
Bifacially retouched flakes										
Smoothing-edge	-	00/00	1	50/01	-	00/00	-	00/00	1	12/01
Feathered-unifacial	1	17/03	-	00/00	-	00/00	-	00/00	1	12/01
Feathered-bifacial	4	67/10	1	50/01	-	00/00	-	00/00	5	62/03
Hinged-unifacial	1	17/03	-	00/00	-	00/00	-	00/00	1	12/01
Tabular knife										
Smoothing-edge	4	100/10	22	96/31	5	100/24	3	100/17	34	97/23
Smoothing-bifacial	-	00/00	1	04/01	-	00/00	-	00/00	1	03/01
Scraper										
Smoothing-unifacial	-	00/00	1	50/01	-	00/00	-	00/00	1	12/01
Feathered-unifacial	3	100/08	-	00/00	-	00/00	-	00/00	3	37/02
Feathered-surface	-	00/00	1	50/01	-	00/00	-	00/00	1	12/01
Hinged-unifacial	-	00/00	-	00/00	-	00/00	3	100/17	3	37/02
Biface										
Smoothing-edge	-	00/00	3	43/04	-	00/00	-	00/00	3	21/02
Feathered-unifacial	1	25/03	1	14/04	-	00/00	-	00/00	2	14/01
Feathered-bifacial	1	25/03	-	00/00	1	100/05	2	100/11	4	28/03
Hinged-unifacial	-	50/05	2	28/03	-	00/00	-	00/00	4	28/03
Hinged-bifacial	-	00/00	1	14/01	-	00/00	0	00/00	1	12/01
Drill										
Hinged-unifacial	-	00/00	3	75/04	-	00/00	-	00/00	3	75/02
Hinged-point	-	00/00	1	25/01	-	00/00	-	00/00	1	25/01
Chopper										
Smoothing-edge	-	00/00	1	50/01	1	25/05	1	17/05	3	25/02
Smoothing-bifacial	-	00/00	1	50/01	-	00/00	2	33/11	3	25/02
Smoothing-point	-	00/00	-	00/00	-	00/00	1	17/05	1	08/01
Crushed-edge	-	00/00	-	00/00	-	00/00	2	33/11	2	17/01
Crushed-bifacial	-	00/00	-	00/00	1	25/05	-	00/00	1	08/01
Crushed-terminal surface	-	00/00	-	00/00	2	50/08	-	00/00	2	17/01
Indeterminate										
Abraded-surface	-	00/00	1	100/01	-	00/00	-	00/00	1	100/01
TOTAL	38		70		21		18		147	

to the scraping or processing of hides. Choppers at 45-DO-243 exhibit crushing wear on surfaces, as well as on edges, bifacial edges and points, indicative of use as hammers as well as heavy chopping tools. We conclude that tool forms were used for purposes not necessarily defined by obvious morphological attributes of form nor by attached functional labels. This inference is hardly startling but it does indicate the need for analyses concerned with the identification of individual wear patterns, if we are to reasonably approach differences in temporal or spatial distribution and the actual use of specific tool forms.

Table 3-18 ranks functional types in two ways for comparison: by the proportion of specimens within a functional type with a certain kind of wear; and by the percentage of specimens within that functional type with that kind of wear for the entire tool assemblage. A close correspondence in the order of the two rankings may indicate prehistoric selection of a specific tool form for a defined task. A lack of correspondence in the two rankings may indicate that use indicated by the type of wear did not require a specialized tool.

Definitive characteristics of functional types are largely those noted in previous tables. Smoothing wear on edges only is most characteristic of tabular knives, although it is also recorded on a high proportion of choppers and bifaces at 45-DO-243. Smoothing wear on unifacial and bifacial edges is found on a variety of small flaked tool types, but is most characteristic of drills, projectile points and resharpening flakes at 45-DO-242, and choppers and scrapers at 45-DO-243. Smoothing on points occurs only on gravers and drills at 45-DO-242, and only on choppers at 45-DO-243. Feathered chipping on an edge only occurs on a very small proportion of utilized flakes from 45-DO-243. Feathered chipping on unifacial and bifacial edges is characteristic of a variety of small flaked tool forms, but occurs most frequently on utilized flakes, bifacially retouched flakes, unifacially retouched flakes, bifaces and scrapers at both sites. Feathered chipping on points is found on drills and projectile points at 45-DO-242 and on utilized flakes at 45-DO-243. Hinged chipping on an edge is recorded only for a low proportion of utilized flakes at 45-DO-243. Hinged chipping on unifacial and bifacial edges is again common on a wide variety of small flaked tool forms, but is most frequent on drills, gravers, bifaces, unifacially retouched flakes, resharpening flakes and projectile points. Hinged chipping on points is most characteristic of drills and gravers. Crushing of edges only is found on choppers at 45-DO-243. Crushing of unifacial and bifacial edges is characteristic of choppers recovered from 45-DO-242, and found on a very low proportion of choppers at 45-DO-243. Crushing of surfaces is characteristic of hammerstones, hopper mortar bases and millingstones at 45-DO-242, and is found on a low proportion of choppers at 45-DO-243. When we examine the ranking of functional types by type of wear for the whole tool assemblage, we find a varied lack of correspondence in many categories. Those rankings which are congruent include tabular knives in smoothing on edges only; drills, projectile points, and choppers in smoothing on unifacial and bifacial edges; gravers, drills and choppers in smoothing on points only; utilized flakes in feathered chipping on unifacial and bifacial edges at 45-DO-242; drills, projectile points and choppers in feathered chipping on points; gravers, unifacially retouched

Table 3-18. Ranking of functional types by wear type, 45-DO-242 and 45-DO-243.

Wear type	45-DO-242				45-DO-243			
	% of Tool Assemblage		% of Total Assemblage		% of Tool Assemblage		% of Total Assemblage	
Smoothed Edge	Tabular knife	94.0	Tabular knife	12.0	Tabular knife	87.0	Tabular knife	23.0
					Chopper	25.0	Chopper	2.0
					Biface	21.0	Biface	2.0
					Bifacially retouched flake	12.0	Bifacially retouched flake	1.0
Unifacial/ bifacial	Drill	33.0	Drill	1.0	Chopper	25.0	Chopper	2.0
	Projectile point	33.0	Projectile point	1.0	Scraper	12.0	Utilized flake	2.0
	Resharpening flake	25.0	Scraper	1.0	Utilized flake	6.0	Scraper	1.0
	Scraper	7.0	Tabular knife	1.0	Tabular flake	3.0	Tabular flake	1.0
	Biface	6.0	Resharpening flake	0.0				
	Tabular knife	6.0	Biface	0.0				
	Unifacially retouched flake	4.0	Unifacially retouched flake	0.0				
	Utilized flake	1.0	Utilized flake	0.0				
Point	Graver	12.0	Graver	0.0	Chopper	8.0	Chopper	1.0
	Drill	9.0	Drill	0.0				
Feathered Edge					Utilized flake	2.0	Utilized flake	1.0
Unifacial/ bifacial	Utilized flake	79.0	Utilized flake	20.0	Bifacially retouched flake	74.0	Utilized flake	23.0
	Bifacially retouched flake	72.0	Unifacially retouched flake	6.0	Utilized flake	53.0	Bifacially retouched flake	4.0
	Scraper	54.0	Scraper	5.0	Unifacially retouched flake	50.0	Biface	4.0
	Unifacially retouched flake	45.0	Bifacially retouched flake	2.0	Biface	42.0	Scraper	2.0
	Biface	41.0	Biface	2.0	Scraper	37.0	Unifacially retouched flake	1.0
	Resharpening flake	25.0	Resharpening flake	0.0				
	Projectile point	14.0	Projectile point	0.0				
	Graver	12.0	Graver	0.0				
	Drill	8.0	Drill	0.0				
Point	Drill	10.0	Drill	1.0	Utilized flake	3.0	Utilized flake	1.0
	Projectile point	5.0	Projectile point	0.0				
Hinged Edge					Utilized flake	2.0	Utilized flake	1.0
Unifacial/ bifacial	Graver	62.0	Scraper	8.0	Drill	75.0	Utilized flake	13.0
	Scraper	58.0	Unifacially retouched flake	7.0	Unifacially retouched flake	50.0	Biface	4.0
	Biface	51.0	Utilized flake	7.0	Biface	40.0	Drill	2.0
	Resharpening flake	50.0	Biface	3.0	Scraper	37.0	Unifacially retouched flake	2.0
	Unifacially retouched flake	48.0	Projectile point	2.0	Utilized flake	31.0	Scraper	2.0
	Projectile point	48.0	Drill	2.0	Bifacilly retouched flake	12.0	Bifacially retouched flake	1.0
	Drill	41.0	Graver	1.0				
	Bifacially retouched flake	28.0	Bifacially retouched flake	1.0				
	Utilized flake	20.0	Resharpening flake	0.0				
Point	Graver	12.0	Graver	0.0	Drill	25.0	Drill	1.0
	Unifacially retouched flake	1.0	Unifacially retouched flake	0.0	Utilized flake	2.0	Utilized flake	1.0
Crushed Edge					Chopper	17.0	Chopper	1.0
Unifacial/ bifacial	Chopper	100.0	Chopper	1.0	Chopper	8.0	Chopper	1.0
Surface	Hammer	100.0	Hammer	3.0	Chopper	17.0	Chopper	1.0
	Hopper base	100.0	Hopper base	0.0				
	Millingstone	100.0	Millingstone	0.0				
Abraded Surface					Indeterminate	100.0	Indeterminate	1.0

flakes, drills and utilized flakes in hinged chipping on points; and choppers, hammerstones, hopper mortar bases and millingstones in all variants of crushing wear. Correlations of functional types and wear types on unifacial and bifacial edges show the most marked variance in the two proportional rankings, generally characterized by the dominance of simple utilized flakes in most proportional rankings by percent of the total tool assemblage. It seems obvious that the utilized flake, the most frequent tool form in the assemblages from either site, was the favored multipurpose tool, used for a wide range of purposes not limited to sharp unifacial or bifacial edges, but also encompassing points, and spanning the smoothing, feathered chipping and hinged chipping wear classes. Correlations of functional types and wear types are generally comparable at both sites, the most marked difference being the variable, intensive use of choppers at 45-DO-243. At this site, choppers were recorded in the smoothing as well as the crushing wear class, and have wear on edges only, unifacial and bifacial edges, points and surfaces. This would seem to indicate that choppers at this site had multiple uses, and were more intensively used than comparable tool forms at 45-DO-242.

In summary, it appears that rigid selection of a particular object form for a task was largely confined to the manufacture of points, and thus, functional types such as gravers, drills and projectile points. Edged tools, unifacial or bifacial, seem to have had more varied uses, commensurate with their more generalized form. Whatever the actual range of uses for these functional types, examination of associated wear types clearly documents use of most edged tool forms for a wide variety of tasks, not necessarily predictable from the traditional functional labels. While there is a tendency for obvious (i.e., specialized) forms, particularly those with points, to have been used as the attached functional label suggests, it is clear that even shaped objects were often used for jobs not indicated by the assumed function. We have noted that simple utilized flakes apparently were adapted to the widest range of tasks. Less obvious examples include projectile points, used for cutting and scraping as well as perforating, and scrapers, with hinged chipping wear more indicative of heavy cutting than scraping of soft hides. Choppers at 45-DO-243 are also intriguing--the types of wear observed on these forms reflect uses not predictable from the label. The smoothing wear on choppers seems, rather, to reflect the working of hides or other relatively soft materials, possibly in conjunction with an anvil.

SUGGESTED USE

Feathered chipping and feathered chipping-smoothing most likely represents light cutting operations on comparatively soft materials--hide, meat, tendon or soft plant parts. Hinged chipping and hinged chipping-smoothing indicate heavier, deeper cutting actions in which the tool comes into contact with bone, gristle or other hard but elastic material. Smoothing by itself may be, depending on the material being worked, produced by quite different uses. For example, smoothing along a unifacial or bifacial edge on a cryptocrystalline tool likely evidences light cutting or scraping use on a soft, elastic material. However, smoothing wear on an edge only on a

quartzite tool, with its denser, less brittle and less sharp mass, may indicate cutting on hard, dense material which simply wears down the edge. Our cursory analysis does not permit us to investigate smoothing wear more thoroughly (i.e., does the smoothing wear obliterate flake scars or other landmarks along the working edge, or does it obliterate the manufacture altogether, or are there striae within the smoothing wear? etc.). Crushing wear, either in combination with pecking or hinged or feathered chipping, indicates heavy tool use and repeated contact with hard surfaces like bone and/or stone working supports.

In general, then, we have four primary tool types described by attributes of wear: smoothing on edges and points, feathered chipping on edges and points, hinged chipping on edges and points, and crushing of edges and surfaces. Combinations thereof indicate variable functions, variable intensity of use, or persistent reuse of tool forms. The tabular knife category provides a good example of the difficulty in trying to assess tool use within these broad attribute categories. Characterized by smoothing wear on edges only, tabular knives are ubiquitous. Because the smoothing wear does not extend onto any adjoining planar surface, we speculate that the tabular knife was held upright in the hand perpendicularly to he stock and used to cut, or saw through elastic material of some hardness, and perhaps came into contact with a stone working base. Certainly, the attrition of the edge, which obliterates flaking irregularities or other landmarks of manufacture, is not the result of cutting or scraping of soft, elastic material such as hide or meat, unless the hides or meat were worked over a solid, hard base which, rubbing against the knife, dulled the working edge over extended periods of use. Whatever their actual use, their wear patterns distinguish them from other flake tool forms on which smoothing consistently occurs on unifacial and bifacial edges and points indicative of cutting, scraping and perforating uses, usually on relatively soft, tractable materials.

Another example of the difficulty of assessing tool function lies in the simple distinction between feathered and hinged chipping wear as distinct types of wear. This distinction is the least pronounced of the four defined wear types--similar tool forms characteristically have both kinds of wear, although one or the other tends to predominate. We may explain this distinction on the basis of both cutting activity and worked medium--feathered chipping is produced by light cutting on relatively soft materials while hinged chipping reflects heavier, deeper cutting in which the tool comes into contact with harder, but still elastic materials. Or we may suggest that the distinction rests on the intensity and/or duration of use of the tool form. Finally, we may submit that the difference, unless clearly correlated with distinctive tool forms, is inconsequential: both wear types indicate general butchering activity; any distinctions result from random use of like tool forms for light or heavy cutting, or variation in intensity or duration of use.

All of the flaked tool types recovered, except tabular knives, show feathered and hinged chipping wear. Those with the least manufacture (e.g., simple utilized flakes and linear flakes) show the highest occurrence of feathered chipping wear. More complex tool forms or those that show

resharpening or retouch (e.g., scrapers, bifaces, resharpening and retouched flakes) have proportionately higher frequencies of hinged chipping wear. The seeming correlation between feathered chipping wear and hinged chipping wear and relatively unmodified and carefully shaped or maintained tools respectively, leads us to suspect that the two wear types may be largely a function of the intensity or duration of use in comparable activities.

EDGE ANGLE DISTRIBUTIONS

Measurement of edge angles within these general functional classes gives us another, complementary method of evaluating the function of different tool forms and differences in the activities represented within the defined analytic zones. Figure 3-7 illustrates edge angle distributions for functional types from sites 45-DO-242 and 45-DO-243 with two divisions: artifacts exhibiting wear only and artifacts with both wear and manufacture. Artifacts with wear or wear and manufacture on surfaces, and those coded indeterminate are not included in these graphs.

The edge angle distributions shown in Figure 3-8 generally support inferences drawn from consideration of attributes of wear. Those artifacts recorded as having wear only, which are primarily simple utilized flakes, show distributions skewed toward acute edge angles in the range 6-30 degrees, reflecting selection for a sharp cutting edge and little concern for durability. The edge angles of artifacts with wear and manufacture have a somewhat bimodal, distribution within the range spanning 36-65 degrees. Despite the overlap between the two distributions, there does appear to be a fundamental difference in tool design which is directly related to the nature of the task at hand and, perhaps more importantly, to the effort expended in the manufacture of a tool and its durability. The simple utilized flake is the most common tool form in the collection from either site, and is also the favorite multipurpose tool, adapted to a wide range of uses commensurate with a number of manufactured tool forms. It is also the tool form used consistently whenever the primary requirement is a sharp edge. Manufactured tool forms, especially those with points or some other deliberately introduced design element, were generally manufactured with more oblique edge angles, most likely for the sake of durability.

ECONOMIC PATTERNS

The vast majority of stone tools recovered from sites 45-DO-242 and 45-DO-243 document cutting, piercing, scraping and chopping uses on soft to hard elastic materials, characteristics commonly associated with hunting-butchering-processing of game. Many of the tool forms could have been used for other related and unrelated tasks (e.g., the cutting and scraping of wood for projectile shafts or tool handles or the cutting and scraping of plant fibers for the weaving of baskets or for consumption), but the character of the tool assemblage, as well as the feature associations, and faunal assemblage, seems to indicate a site economy largely geared to hunting. Feathered and hinged chipping wear, often associated with smoothing, and

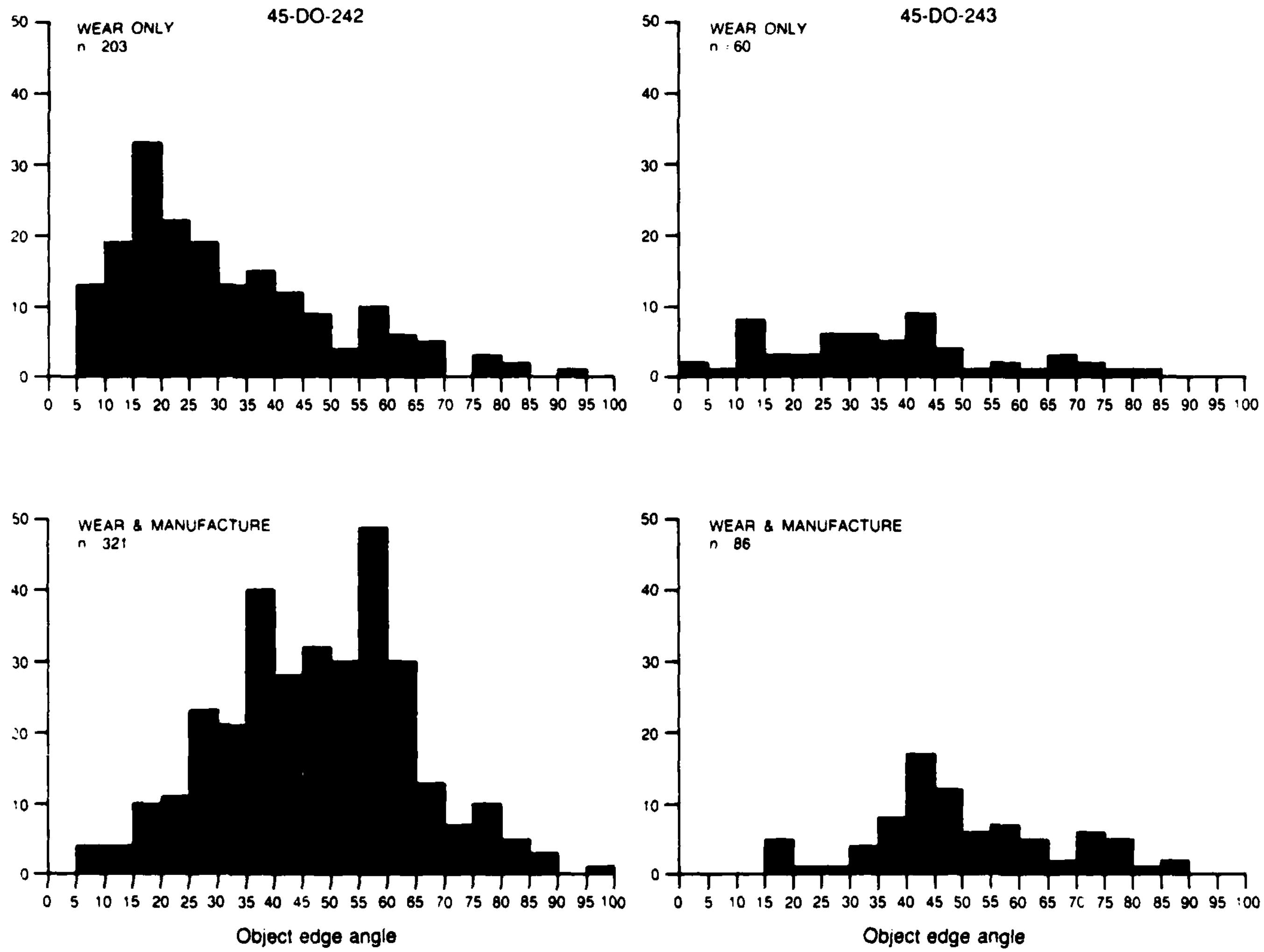


Figure 3-8. Edge angle distributions of worn only and worn and manufactured objects at 45-DO-242 and 45-DO-243.

occurring primarily on the unifacial and bifacial edges of simple flake tools, bifaces, and projectile points indicates tool use on soft and hard materials or consistent reuse and heavier use of some functional types. Smoothing on the edges of tabular knives, and the recovery of a large number of scrapers, may indicate an emphasis on hide processing. However, it is equally likely that these forms were used to separate the meat of a carcass from bone, to reduce bone, or to manufacture non-lithic elements of the tool kit (e.g., to shape and smooth wood or bone foreshafts and handles). The smoothing wear on the edges and points of choppers recovered from 45-DO-243 seems to indicate use of these tools for reduction of comparatively soft, elastic materials, perhaps wood. The wear patterns are very different from those on choppers from 45-DO-242, whose badly crushed edges indicate heavy use on hard materials, most likely bone, perhaps in conjunction with a stone support base. The latter pattern of chopper use is characteristic of Hudnut Phase and later Coyote Creek Phase assemblages in the Rufus Woods Lake project area. The former pattern, the smoothing of edges and points, is more similar to wear patterns observed on similar tool forms recovered from the Kartar Phase assemblage at 45-OK-11 (Lohse 1984f). Some of these choppers were recovered from the Kartar Phase, Zone 24 but the majority were from Zones 23 and 22, which are Hudnut Phase assemblages. It is therefore unlikely that the use patterns observed on these tool forms from 45-DO-243 are diagnostic of a particular temporal period. It would seem rather that they represent the occurrence of a distinct set of activities at 45-DO-243, perhaps an emphasis on wood working. The crushing of surfaces on hammerstones, hopper mortar base, and two millingstones recovered from 45-DO-242 seems consistent with traditionally postulated use patterns: hammerstones used for lithic reduction and, quite possibly, bone maceration; hopper mortar bases used as a base for seed or root pounding or grinding; millingstones for seed cracking and grinding.

TEMPORAL AND SPATIAL PATTERNS

Surveying the artifact assemblage recovered from 45-DO-242, we see it contains many functional tool types, some use-specific, others less so. Among the use-specific tools are drills, gravers, bifaces, scrapers, choppers, hammerstones, millingstones and a single shaft abrader. The tool types more generalized in function are projectile points, linear flakes, tabular flakes, retouched flakes and simple utilized flakes. It is generally true that the less shaped or finished the tool form, and the smaller its size, the wider the range of its potential applications. Chipped forms are much more tractable than ground or unmodified forms and so can be shaped to the task at hand more easily. Table 3-16, presented previously, demonstrates how varied the use of a single object might be. Such objects were parts of everyday tool kits, and are found littered about surfaces where game was processed as well as campsites, locations perhaps visited frequently but not for extended periods. That the assemblage from 45-DO-242 contains a large number of more use-specific tools indicate that this site was occupied for longer periods. The

number of housepits and other structures exposed in Zones 12 and 13 supports this inference.

The artifact assemblage from 45-DO-243, on the other hand, contains a more limited range of functional tool types. Use-specific tools such as drills, gravers, hammerstones, milling stones, and shaft abraders are lacking. More generalized forms such as tabular flakes, retouched flakes, and utilized flakes are more numerous, very nearly approximating the proportions observed at 45-DO-242. This does not necessarily imply that prehistoric activities at 45-DO-243 differed markedly from those performed at 45-DO-242. On the contrary, activities at 45-DO-243 were probably very similar to those at 45-DO-242: the occupants at both sites worked similar materials making use of virtually identical tool kits. The difference probably lies in the duration of the activity and the nature of the cultural occupation.

The documented reuse of both sites over time, however, calls into question such general inferences. At 45-DO-243, as at 45-DO-242, some zones consistently produced more artifacts, and a greater diversity of artifacts. Zone 22 at 45-DO-243 consistently had the highest counts of artifacts, particularly use-specific tool forms like cores, drills and scrapers. Interestingly, Zone 22 produced the only evidence of a possible housepit or other constructions at 45-DO-243.

Drawing upon the results of functional analyses, we may formulate a general picture of the occupations at both sites. The range of tool types indicates the inhabitants processed both animal and plant products. The typical wear patterns (flaked edge with feather chipping, hinged chipping, and smoothing wear) are indicative of cutting, scraping and other routine butchering tasks. But the inhabitants also carried out heavier jobs such as stone tool production, bone working, and perhaps wood working, as the presence of such use-specific tools as hammerstones and choppers suggests. The recovery of specialized drills and gravers indicates some manufacture of bone and hide products. The inhabitants at 45-DO-242 also made use of millingstones and hopper bases to process foods, possibly seeds, roots, or dried meat. The most common tool at both sites, however, was the simple utilized flake, which was used for numerous tasks.

We have noted a continuity in tool forms and use over the span of prehistoric occupation at both sites. 45-DO-242, however, has a more varied and numerous tool assemblage than 45-DO-243 and this is largely attributable to the larger, dense artifact assemblage recovered from Zone 13. This cultural layer contained pit houses and identifiable activity surfaces, indicating an occupation or occupations of some duration and the performance of a broad range of jobs requiring many tools including task-specific tools. Both earlier and later zones at the site are more similar to those exposed at 45-DO-243, consisting principally of short-term campsites and processing stations. In Zone 22 at 45-DO-243, however, we again note a greater incidence of varied tool forms, and this is accompanied by a possible pit house and several cultural features.

Table 3-19. Dimensions of morphological projectile point classification.

DIMENSION I: BLADE-STEM JUNCTURE

N. Not separate
1. Side-notched
2. Shouldered
3. Squared
4. Barbed
9. Indeterminate

DIMENSION II: OUTLINE

N. Not applicable
1. Triangular
2. Lanceolate
9. Indeterminate

DIMENSION III: STEM EDGE ORIENTATION

N. Not applicable
1. Straight
2. Contracting
3. Expanding
9. Indeterminate

DIMENSION IV: SIZE

N. Not applicable
1. Large
2. Small

DIMENSION V: BASAL EDGE SHAPE

N. Not applicable
1. Straight
2. Convex
3. Concave
4. Point
5. 1 or 2 and notched
9. Indeterminate

DIMENSION VI: BLADE EDGE SHAPE

N. Not applicable
1. Straight
2. Excurvate
3. Incurvate
4. Reworked
9. Indeterminate

DIMENSION VII: CROSS SECTION

N. Not applicable
1. Planoconvex
2. Biconvex
3. Diamond
4. Trapezoidal
9. Indeterminate

DIMENSION VIII: SERRATION

N. Not applicable
1. Not serrated
2. Serrated
9. Indeterminate

DIMENSION IX: EDGE GRINDING

N. Not applicable
1. Not ground
2. Blade edge
3. Stem edge
9. Indeterminate

DIMENSION X: BASAL EDGE THINNING

N. Not applicable
1. Not thinned
2. Short flake scars
3. Long flake scars
9. Indeterminate

DIMENSION XI: FLAKE SCAR PATTERN

N. Not applicable
1. Variable
2. Uniform
3. Mixed
4. Collateral
5. Transverse
6. Other
9. Indeterminate

Table 3-20. Morphological classes of projectile points: descriptive name, classification code, and line segment definition.

Type	Description	Classification	Definition
1	Large Triangular	N 1 N 1	aA
2	Small Triangular	N 1 N 2	aA
3	Large Side-notched	1 N N 1	aA123, aA1234, aA12345
4	Small Side-notched	1 N N 2	aA123, aA1234, aA12345
5	Lanceolate	N 2 N N	aA
6	Shouldered Lanceolate	2 2 N N	aA, aA1, aA12
7	Large, Shouldered Triangular, contracting stem	2 1 2 1	aA, aA1
8	Small, Shouldered Triangular, contracting stem	2 1 2 2	aA, aA1
9	Large, Shouldered Triangular, non-contracting stem	2 1 (13) 1	aA12, aA123
10	Small, Shouldered Triangular, non-contracting stem	2 1 (13) 2	aA12, aA123
11	Large, Squared Triangular, contracting stem	3 1 2 1	aA1
12	Small, Squared Triangular, contracting stem	3 1 2 2	aA1
13	Large, Squared Triangular, non-contracting stem	3 1 (13) 1	aA12, aA123
14	Small, Squared Triangular, non-contracting stem	3 1 (13) 2	aA12, aA123
15	Large, Barbed Triangular, contracting stem	4 1 2 1	aA1
16	Small, Barbed Triangular, contracting stem	4 1 2 2	aA1
17	Large, Barbed Triangular, non-contracting stem	4 1 (13) 1	aA12, aA123
18	Small, Barbed Triangular, non-contracting stem	4 1 (13) 2	aA12, aA123

STYLISTIC ANALYSIS

Projectile points are the only class of artifacts from sites 45-DO-242 and 45-DO-243 used for assessment of temporal period and/or cultural affiliation. They supply us with a reasonable temporal scale when we carefully compare stylistic attributes of specimens in this collection with those considered diagnostic of defined projectile point types, either within this project area or on the Columbia Plateau as a whole.

PROCEDURES

Two separate but conceptually related analyses are used to classify projectile points. A morphological classification is used to define descriptive types that do not directly correspond to recognized historical types. This is intended as an independent check on the temporal distribution of projectile point forms in the Rufus Woods Lake project area and as a means to measure the distribution of formal attributes as well as point styles. A historical classification correlates these projectile points with recognized types with discrete temporal distributions. A multivariate statistical program which compares line and angle measurements taken along the outlines of the points is used to classify the specimens. Together, these analyses allow us to (1) assess formal and temporal variation in our collection without first imposing prior typological constructs, (2) correlate specimens recovered from our study area with those found elsewhere on the Columbia Plateau in a consistent, verifiable manner, (3) develop a typology that incorporates both qualitative and quantitative scales of measurement, and (4) examine the temporal significance of specific formal attributes as well as aggregates viewed as ideal types.

Eleven classificatory dimensions have been defined for morphological classification: BLADE/STEM JUNCTURE, OUTLINE, STEM EDGE ORIENTATION, SIZE, BASAL EDGE SHAPE, BLADE EDGE SHAPE, CROSS SECTION, SERRATION, EDGE GRINDING, BASAL EDGE THINNING, and FLAKE SCAR PATTERN (Table 3-19). Of these, the first four (DI-DIV) define 18 morphological types (Figure 3-9). The other seven serve to describe these types more fully, and permit the identification of variants within the types.

Each of the 18 morphological types can be defined in terms of a unique margin. This is done by drawing straight lines from nodes where the outline of the specimen changes direction. Figure 3-10 illustrates the technique. For a corner-notched triangular point, the blade is defined as line segment a A. The shoulder is line segment A 1. The neck is node 1. The stem is line segment 1 2. The base is line segment 2 a'. Terms applied and the number of line segments drawn vary given the two basic subdivisions of form. Lanceolates are generally defined by four or fewer line segments (aA12). Stemmed triangular forms are defined by five or fewer line segments (aA123). Side-notched triangular forms are defined by five or more line segments (aA12345). Table 3-20 lists the eighteen morphological types with descriptions, classification codes, and line segment definitions.

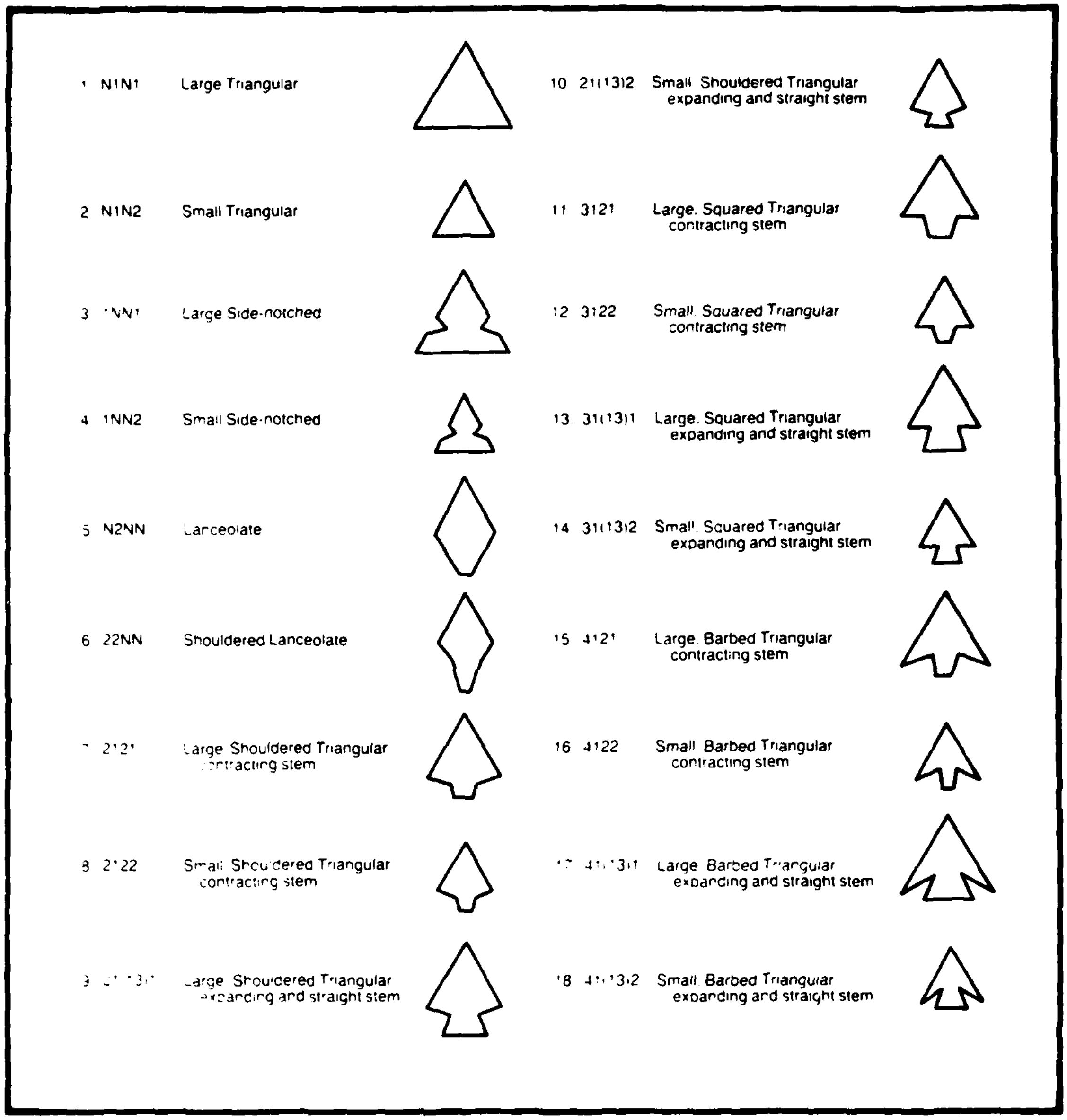


Figure 3-9. Morphological classification of projectile points.

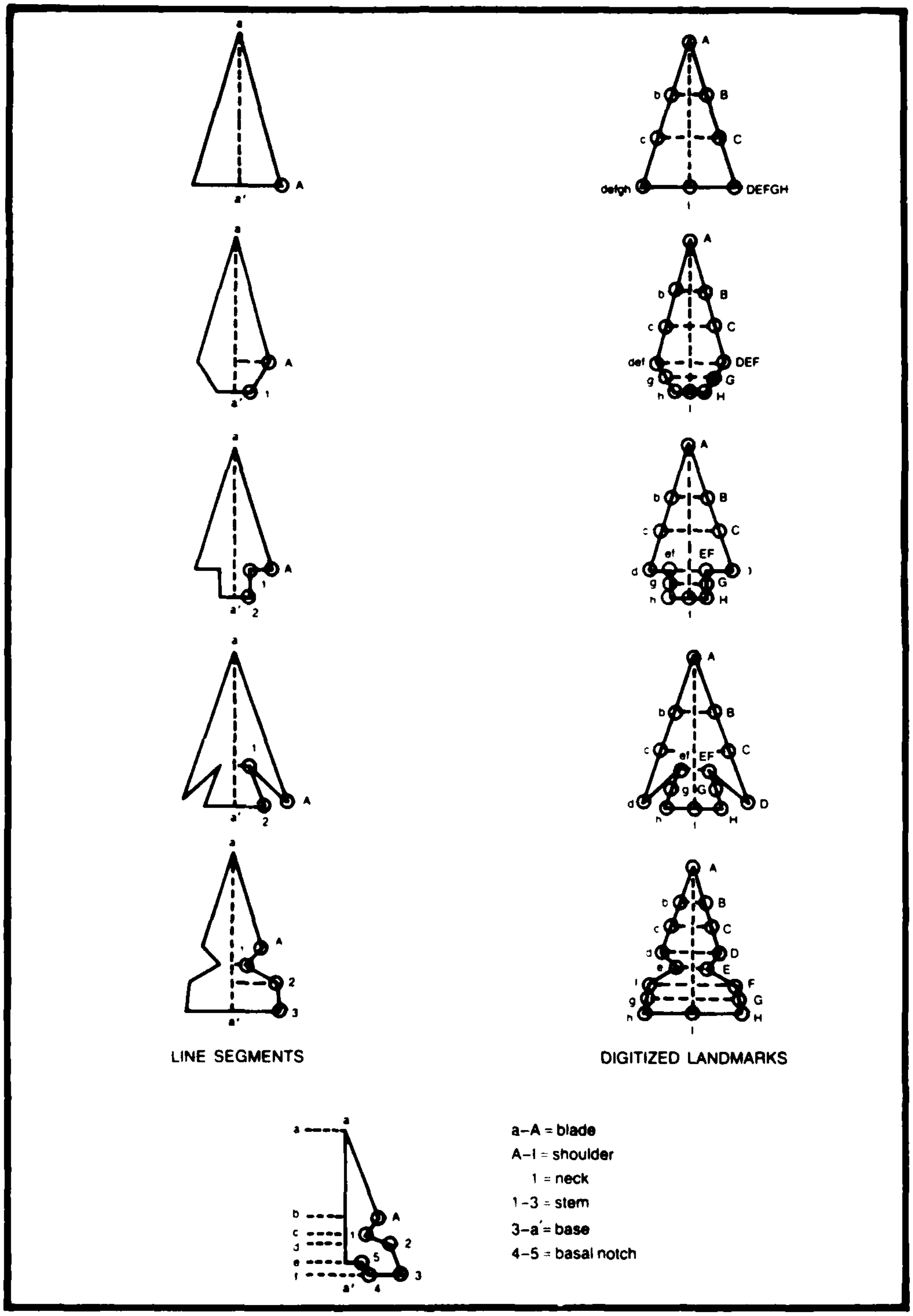


Figure 3-10. Definition of projectile point outline.

Cross-tabulation of classificatory dimensions V through XI supplies detailed descriptions of the eighteen morphological types and allows us to assess the temporal distribution of formal attributes as well as that of point styles. We might subdivide any or all of the types in terms of their basal edge shape, serration, or flaking pattern. We can also assess the chronological significance of concave bases, serrated margins, or regular collateral flaking pattern independent of associated morphological type. Further, we can use this information to establish variants in the basic historical types.

We have defined historical types on the basis of line and angle measurements in order to have a consistent classification method which utilizes published illustrations of projectile points. Other measurements such as weight and thickness were taken on projectile points in our collection, but problems of cost and efficiency precluded handling of specimens from other study areas. These measurements can be included in analyses of our points, and, hence, for definition of types and type variants that will correlate with acknowledged types, but they are not part of the initial typological exercise. Justification for this decision is found in prior research emphasizing the outline of projectile points as the basis of classification (Benfer 1967; Ahler 1970; Gunn and Prewitt 1975; Holmer 1978).

Our desire for a statistically derived classification prompted selection of a multivariate statistical method termed discriminant analysis (Nie et al. 1975). In this analysis, individual specimens are sorted into selected groups on the basis of mathematical equations derived from analysis of cases with known memberships. First, we assembled representative specimens for each acknowledged historical type, and tested group autonomy through analysis of specified discriminating variables. Then, we used derived equations called discriminant functions to assign specimens in our collection to the statistically defined projectile point types. All cases are given a probability of group membership, calculated as the distance a given case score is away from a group score. Discriminating variables--those providing the most separation between groups--are ranked and serve as type definitions. The outcome is a statistically defensible projectile point typology based on traditional, intuitively derived classifications. The resulting classification is consistent, and produces mathematically defined ranges of variability. It enables the researcher to quickly categorize a large collection, and it offers a sound, rational basis for definition of new types as well as an explicit definition of accepted types. We can thereby correlate the Rufus Woods Lake projectile point sequence with other chronologies in both a quantitative and qualitative manner. For a detailed discussion of procedures and assumptions involved in discriminant analysis see Johnson (1978) and Klecka (1980).

We assembled a type collection for the Columbia Plateau of over 1200 specimens that constituted originally defined type examples, labelled specimens of recognized types, or type variants that were reasonably well dated. By critically reviewing the archaeological literature, we identified 23 historical types which we arranged in six formal type series (Figure 3-11). We consistently applied distinctions based on the original type definitions,

HISTORICAL TYPE CLASSIFICATION

DIVISION	LANCEOLATE		TRIANGULAR			
SERIES	SIMPLE	SHOULDERED	SIDE-NOTCHED	CORNER-REMOVED	CORNER-NOTCHED	BASAL-NOTCHED
TYPE	11 LARGE LANCEOLATE	12 LIND COULEE	41 COLD SPRINGS	51 NESPELEM BAR	61 COLUMBIA A Corner-notched	71 QUILOMENE A Basal-notched
	15 WINDUST C Contracting base	13 WINDUST A	42 PLATEAU Side-notched	52 RABBIT ISLAND A	62 QUILOMENE Corner-notched	72 QUILOMENE B Basal-notched
	21 CASCADE A	14 WINDUST B		53 RABBIT ISLAND B	63 COLUMBIA B Corner-notched	73 COLUMBIA STEM A
	22 CASCADE B	31 MAHKIN SHOULDERED			64 WALLULA Rectangular stemmed	74 COLUMBIA STEM B
	23 CASCADE C					75 COLUMBIA STEM C

Types are numbered consecutively within formal series a two-digit code indicates the approximate temporal sequence of defined series and types

Type names are those most commonly applied Mahkin Shouldered and Nespelem Bar are types defined for the Rufus Woods Lake project area

Figure 3-11. Historical projectile point types.

modified, where appropriate, by subsequent research. We routinely defined type variants, usually suggested by prior researchers, which segregate specimens according to diagnostic patterns in morphology. Historical types identified here represent a synthesis of projectile point types and cultural reconstructions postulated by researchers in different areas of the Columbia Plateau, and were not taken from any single typology or chronological sequence (e.g., Butler 1961, 1962; Nelson 1969; Leonhardy and Rice 1970). Names are usually those applied by the first researcher to define a specific type. We developed variant labels by using the accepted type name followed by a letter denoting diagnostic variation.

A total of 53 projectile points from 45-DO-242 were assigned to morphological and historical types (Table 3-21). Another 31 projectile point fragments from that site were assigned to morphological types and/or coded within the morphological classification (Table 3-22). A total of 15 projectile points found at 45-DO-243 was assigned to morphological and historical types (Table 3-21), and another three projectile point fragments were coded within the morphological classification (Table 3-21). Projectile points are illustrated in Plates 3-6 through 3-9. Digitized outlines are shown in Appendix B, Figure B-1.

Twelve of the morphological types and thirteen of the historical types are represented among 68 projectile points from 45-DO-242 and 45-DO-243. Distributions of types within the two sites show some marked temporal differences in occupations. At 45-DO-242, the earliest occupations are characterized by large, corner-notched points, and the latest, by small, side-notched points. At 45-DO-243, the earliest occupations contain lanceolate points, while successively later occupations produced a variety of large corner-notched points like those recovered from the early occupation at 45-DO-242. Correlation of these types with the available suite of radiocarbon dates from the two sites and with historical projectile point type distributions, defined for the Rufus Woods Lake project area, clearly demarcate different periods of site use. The earliest period of occupation at 45-DO-243 (Zone 24) appears to date to the mid- to latter part of the Kartar Phase (ca. 6000-4000 B.P.). The earliest well-defined occupation at 45-DO-242 dates to the early Hudnut Phase (ca. 4000-3000 B.P.), although a lanceolate point and several shouldered lanceolate points from Zone 13 may indicate an ill-defined, late Kartar Phase occupation as well (ca. 5000-4000 B.P.). Occupation at both sites then continues on through the Hudnut Phase, with occupation at 45-DO-243 probably ending at ca. 2000-1500 B.P. Activity at 45-DO-242, however, appears to continue on into the Coyote Creek Phase (ca. 2000-200 B.P.), with small side-notched projectile points characteristic of the late Coyote Creek Phase (ca. 1000-200 B.P.).

Descriptions of individual specimens follow in an outline detailing physical characteristics, notes of historical and functional interest, and existence of comparable specimens. While listings of authors and comparable specimens are not comprehensive, they are sufficient to alert the reader to similar artifacts recovered in nearby study areas. Three measurements are presented for each specimen: length, taken along a perpendicular axis

Table 3-21. Classified projectile points, 45-DO-242 and 45-DO-243.

Master #	Morphological type	Historical type	Classification	Zone	Feature	Association
45-DO-242						
387	1	Not Assigned	N1N11111NNM	13	—	—
52	1	Not Assigned	N1N11221NNM	13	8	Housepit 1 fill
546	1	Not Assigned	N1N12221NNB	11	30	Firepit 7
231	2	—	N1N23121NNB	11	19	Lithic Concentration A
169	2	Not Assigned	N1N23121NNB	11	41	Natural stratum
80	4	Plateau Side-notched	1NN23121NNB	11	12	Cultural stratum
192	4	Plateau Side-notched	1NN23121NNB	11	19	Lithic Concentration A
455	4	Plateau Side-notched	1NN23121NNB	11	—	—
30	4	Plateau Side-notched	1NN23121NN2	11	—	—
230	4	Plateau Side-notched	1NN23828NNB	11	19	Lithic Concentration A
218	4	Plateau Side-notched	1NN23828NNB	11	37	Housepit 2 fill-floor
473	5	Cascade A	N2NNM211112	13	—	—
38	5	—	N2NN8221121	13	—	—
162	5	Mahkin Shouldered	N2NN8221121	12	—	—
130	5	Cascade A	N2NN8221121	11	—	—
180	6	Mahkin Shouldered	22NN8121123	13	—	—
136	6	Mahkin Shouldered	22NNM221128	13	—	—
469	6	—	22NN8111121	12	—	—
256	6	Mahkin Shouldered	22NN8211121	12	4	Cultural stratum[1]
494	7	Nespelem Bar	21211221NNM	13	37	Housepit 2 fill
496	7	Nespelem Bar	21211121NNM	13	42	Housepit 2 floor[3]
100	8	Nespelem Bar	21224122NNB	12	21	Bone Concentration D
291	11	Nespelem Bar	31212211NNM	13	9	Pit 3 floor
608	11	Rabbit Island A	31212121NNM	13	23	Housepit 2 floor[3]
59	11	Rabbit Island B	31212241NNM	13	7	Pit 6 fill
462	11	Nespelem Bar	31212121NN2	12	—	—
2	11	Nespelem Bar	31212191NNM	11	—	—
631	13	Quilomene Bar Corner-notched	31112821NNB	13	—	—
331	13	Quilomene Bar Corner-notched	31111211NNM	13	33	Pit 3 floor
210	13	Columbia Corner-notched A	31111121NNB	13	15	Cultural stratum
209	13	Columbia Corner-notched B	31111221NNB	13	15	Cultural stratum
292	13	Columbia Corner-notched A	31111121NNM	13	9	Pit 3, above Housepit 1
63	13	Columbia Corner-notched A	31111121NNM	13	7	Pit 6
318	13	Columbia Corner-notched A	31312121NNM	13	8	Housepit 1 fill
340	13	Quilomene Bar Corner-notched	31311221NNB	13	8	Housepit 1 fill
151	13	Columbia Corner-notched A	31312121NNM	13	35	Bone Concentration B
105	13	Columbia Corner-notched A	31112121NNB	13	27	Pit 1 fill
439	13	Columbia Corner-notched A	31312221NNM	13	8	Housepit 1 fill
605	13	Nespelem Bar	31111121NNM	13	23	Housepit 2 floor[3]
451	13	Quilomene Bar Corner-notched	31311141NNB	13	23	Housepit 2 floor[3]
346	13	Quilomene Bar Corner-notched	31312221NNB	12	4	Cultural stratum[1]
574	14	Columbia Corner-notched A	31322121NNB	13	23	Housepit 2 floor[3]
320	14	Columbia Corner-notched B	31321121NNB	13	8	Housepit 1 fill
370	14	Columbia Corner-notched B	31321818NNM	13	48	Pit 3 fill
573	14	Columbia Corner-notched B	31322828NNB	13	37	Housepit 2 fill
300	14	Rabbit Island A	31322121NN2	12	—	—
454	15	Columbia Corner-notched A	41211121NNB	13	23	Housepit 2 floor[3]
365	15	Columbia Corner-notched A	41212888NNM	13	33	Pit 3 floor
336	15	Rabbit Island A	41212821NNM	13	8	Housepit 1 fill
453	15	Quilomene Bar Corner-notched	41212121NNM	13	23	Housepit 2 floor[3]
498	15	Rabbit Island A	41211121NNM	11	3	Shell Concentration A
303	17	Quilomene Bar Basal-notched B	41113211NNB	13	—	—
3	17	Wallula Rectangular-stemmed	41312821NNM	11	—	—
45-DO-243						
98	5	Mahkin Shouldered	N2NNM241128	24	—	—
144	5	Cascade B	N2NNM221128	24	—	—
158	5	Cascade A	N2NN8221121	21	—	—
51	6	Mahkin Shouldered	22NNM221121	21	7	Natural stratum
169	7	Nespelem Bar	21214141NNM	23	—	—
130	7	Nespelem Bar	21214122NNB	22	--	—
64	8	Nespelem Bar	21221222NNB	23	—	—
151	11	Rabbit Island A	31212221NNM	22	4	Natural stratum
7	11	Nespelem Bar	31214121NNM	21	—	—
117	12	Rabbit Island A	31221211NNM	21	—	—
174	13	Columbia Corner-notched A	31311221NNM	23	—	—
2	13	Nespelem Bar	31112221NNM	21	—	—
187	15	Quilomene Bar Basal-notched A	41211212NNB	22	--	—
114	15	—	41218811NNM	22	2	Natural stratum
179	17	Quilomene Bar Basal-notched B	41112121NNM	23	—	—

[1] Feature 4, cultural stratum, 45-DO-242, 340±70 B.P. and 701±85 B.P.
[2] Feature 3, shell concentration A, 45-DO-242, 237±80 B.P.
[3] Features 23 and 42, 45-DO-242, 3088±232 B.P. and 3812±456 B.P.

Table 3-22. Projectile point fragments, 45-DO-242 and 45-DO-243.

Morphological type	Classification	Zone	Feature	Association
45-DO-242				
Stems				
2	N1N23121NN1	11	—	—
4	1NN23929NN1	11	19	Lithic Concentration A
4	1NN23929NN1	11	19	Lithic Concentration A
4	1NN23929NN9	11	19	Lithic Concentration A
4	1NN29929NN9	11	19	Lithic Concentration A
5	N2NN1212121	13	--	—
10	21325921NN1	11	13	Cultural stratum
11	31212929NN1	13	33	Pit 6
14	31122929NN9	13	—	—
-	99211929121	13	—	—
-	99321929NN9	13	33	—
-	99212919NN1	13	8	Housepit 1 fill
-	99211919NN1	13	—	—
-	99222999NN9	13	33	Pit 6
-	99392929NN1	13	8	Housepit 1 fill
-	99321929NN1	12	—	—
-	99212929NN1	12	—	—
-	99221929NN9	12	—	—
Bases				
-	99911929123	13	33	Pit 6
Blades				
4	1NN23131NN2	11	19	Lithic Concentration A
5	N2NN9221121	13	—	—
13	31311421NN1	13	8	Housepit 1 fill
-	31919411NN3	13	—	—
-	91929211NN3	12	4	Cultural stratum *
-	41929221NN9	12	—	—
-	21919121NN1	—	Beach	—
-	91919121NN3	--	Beach	—
Reworked-unfinished				
8	21221121NN1	12	—	—
11	31212421NN1	12	4	Cultural stratum*
15	41211111NN3	13	7	Pit 6
-	91321421NN1	13	37	Housepit 2 fill
45-DO-243				
Stems				
-	99212929NN9	22	--	—
Bases				
-	92211929329	23	—	—
-	92211929323	22	--	—

* Feature 4, cultural stratum, 45-DO-242, 340±70 B.P. and 701±85 B.P.

KEY

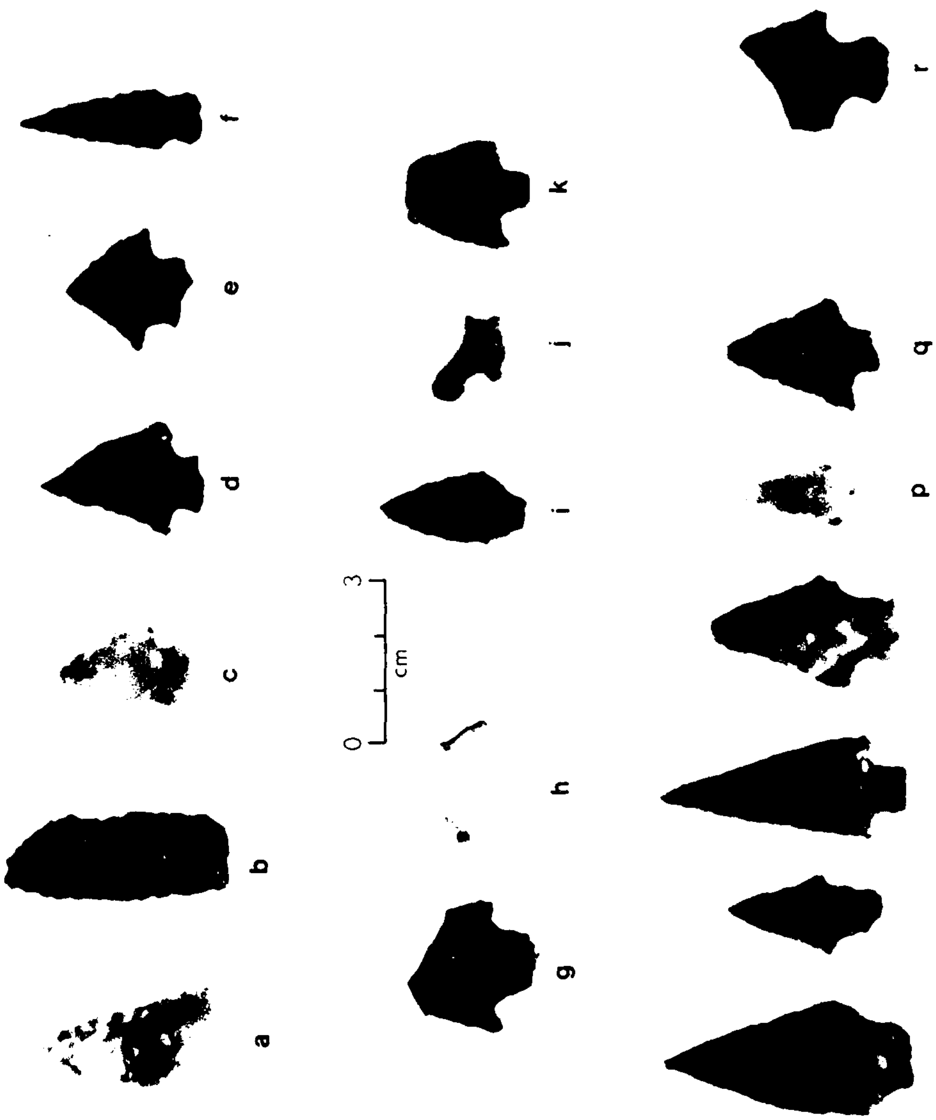
Master number:
Morphological type:
Historical type:
Housepit:
Provenience/Level:
Zone:
Material:

a.	b.	c.	d.	e.	f.
387	317	439	340	318	320
Type 1	-	Type 13	Type 13	Type 13	Type 14
Not Assigned	Not Assigned	Columbia Corner-notched A	Quilomene Bar Corner-notched	Columbia Corner-notched	Columbia Corner-notched B
HP 1 Fill	HP 1 Fill	HP1 Fill	HP1 Fill	HP 1 Fill	HP 1 Fill
4N5W/FE8/210	3N4W/FE8/140	3N6W/FE8/180	3N3W/FE8/140	3N4W/FE8/140	3N4W/FE8/170
3	3	3	3	3	3
Calcedony	Jasper	Chalcedony	Jasper	Jasper	Jasper

g.	h.	i.	j.	k.
335	365	484	573	453
Type 15	Type 15	Type 7	Type 14	Type 15
Rabbit Island A	Columbia Corner-notched A	Nespelem Bar	Columbia Corner-notched B	*Quilomene Bar* Corner-notched
HP 1 Fill	HP 1 Fill	HP 2 Fill	HP 2 Fill	HP 2 Fill
3N3W/FE8/140	4N5W/FE33/130	2N24W/FE37/140	1N27W/FE37/175	1S28W/FE23/150
3	3	3	3	3
Jasper	Chalcedony	Jasper	Jasper	Jasper

l.	m.	n.	o.	p.	q.	r.
486	606	605	451	574	454	151
Type 7	Type 11	Type 13	Type 13	Type 14	Type 15	Type 13
Nespelem Bar	Rabbit Island A	Nespelem Bar	Quilomene Bar Corner-notched	Columbia Corner-notched A	Columbia Corner-notched A	Columbia Corner-notched A
HP 2 Fill	HP 2 Fill	HP 2 Floor	HP 2 Fill	HP 2 Fill	HP 2 Fill	HP 2 Fill
2N24W/FE42/150	2N29W/FE23/180	2N29W/FE23/175	0N27W/FE23/180	1N27W/FE23/180	1S28W/FE23/170	4N33W/FE35/90
3	3	3	3	3	3	3
Jasper	Jasper	Jasper	Jasper	Chalcedony	Jasper	Jasper

Plate 3-6. Projectile points from Housepits 1 and 2, 45-DO-242.

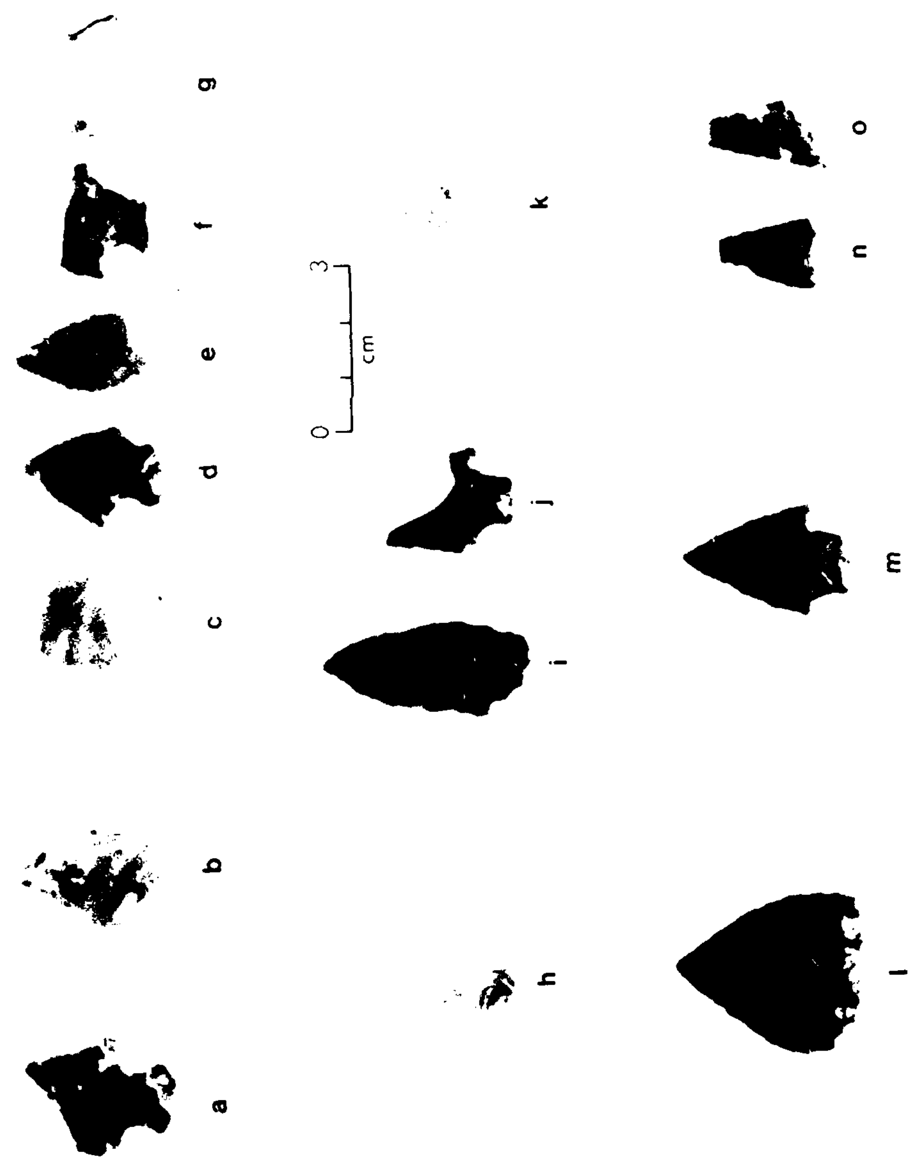


KEY

Master number:
Morphological type:
Historical type:
Feature:
Provenience/Level:
Zone:
Material:

	Master number	Morphological type	Historical type	Feature	Provenience/Level	Zone	Material
a.	151	Type 13	Columbia Corner-notched A	Bone Concentration B	4N33W/FE35/90	3	Jasper
b.	105	Type 13	Columbia Corner-notched A	Pit 1	4N17W/FE27/190	3	Chalcedony
c.	281	Type 11	Nespelem Bar	Pit 3 Fill	2N6W/FE9/130	3	Chalcedony
d.	282	Type 13	Columbia Corner-notched A	Pit 3 Fill	2N6W/FE9/130	3	Jasper
e.	331	Type 13	Quilomene Bar Corner-notched	Pit 3 Fill	3N4W/FE33/190	3	Chalcedony
f.	370	Type 14	Columbia Corner-notched B	Pit 3 Fill	4N5W/FE48/160	3	Jasper
g.	365	Type 15	Columbia Corner-notched A	Pit 3 Fill	4N5W/FE33/130	3	Chalcedony
h.	505	Type 8	Blank	Pit 4 Fill	2N28W/FE32,36/110	2	Opal
i.	59	Type 11	Rabbit Island B	Pit 6 Fill	6N4E/FE7/UL50	3	Jasper
j.	63	Type 13	Columbia Corner-notched A	Pit 6 Fill	6N4E/FE7/60	3	Jasper
k.	100	Type 8	Nespelem Bar	Bone Concentration D	4N17W/FE21/60	2	Jasper
l.	546	Type 1	Not Assigned	Firepit 7	1N28W/FE30/20	1	Jasper
m.	499	Type 15	Rabbit Island A	Shell Concentration A	2N28W/FE3/20	1	Jasper
n.	231	Type 2	–	Lithic Concentration A	5N32W/FE19/40	1	Jasper
o.	192	Type 4	Plateau Side-notched	Lithic Concentration A	5N32W/FE19/30	1	Jasper

Plate 3-7. Projectile points from features, 45-DO-242.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KEY

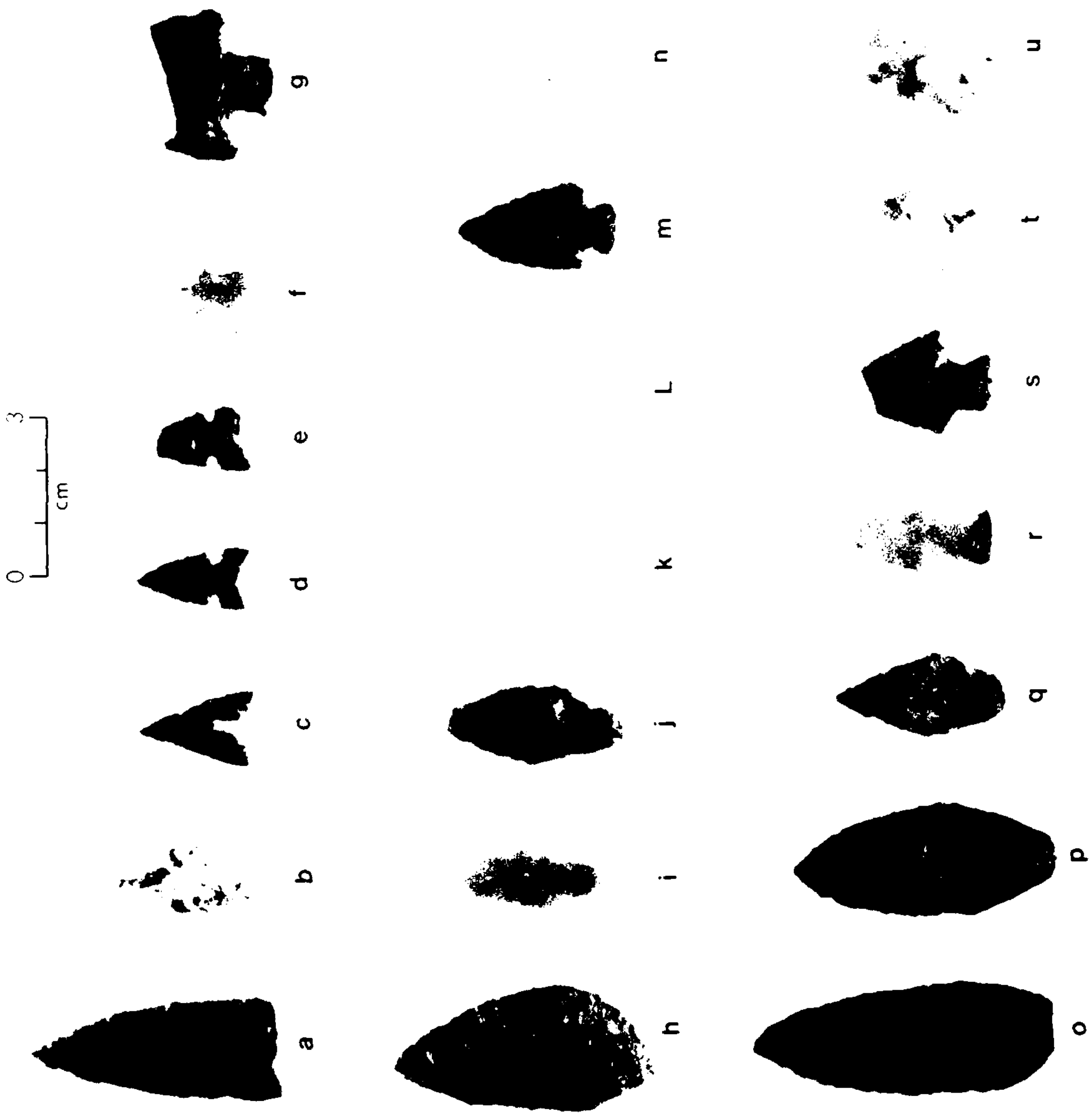
Master number:
Morphological type:
Historical type:
Provenience/Level:
Zone:
Material:

a.	b.	c.	d.	e.	f.	g.
52	130	169	435	80	30	3
Type 1	Type 7	Type 2	-	Type 4	Type 4	Type 17
Not Assigned	Nespelem Bar	Not Assigned	Not Assigned	Plateau Side-notched	Plateau Side-notched	Wallula Rectangular Stemmed
6N4W/10	10N2E/40-70	6N32W/FE41/40	3N51W/FE8/190	1S11W/FE12/10	4S4E/10	4S4E/10
1	1	1	1	1	1	1
Jasper	Jasper	Jasper	Jasper	Jasper	Jasper	Jasper

h.	i.	j.	k.	l.	m.	n.
162	469	136	256	462	346	300
Type 5	Type 6	Type 6	Type 6	Type 11	Type 13	Type 14
Mahkin Shouldered	Not Assigned	Mahkin Shouldered	Mahkin Shouldered	Nespelem Bar	Quilomene Bar Corner-notched	Rabbit Island A
0N7W/20	2N21W/80	1N35W/50	2N30W/FE4/30	2N22W/60	4N6W/FE4/60	2N5W/20
2	2	2	2	2	2	2
Jasper	Jasper	Jasper	Chalcedony	Jasper	Jasper	Chalcedony

o.	p.	q.	r.	s.	t.	u.
473	38	160	209	210	631	303
Type 5	Type 5	Type 6	Type 13	Type 13	Type 13	Type 17
Cascade A	Not Assigned	Mahkin Shouldered	Columbia Corner-notched B	Columbia Corner-notched A	Quilomene Bar Corner-notched	Quilomene Bar Side-notched
1N22W/120	1N14E/60	0N8W/80	5N32W/FE15/60	5N32W/FE15/70	3N26W/140	2N5W/110
3	3	3	3	3	3	3
Fine-grained Basalt	Fine-grained Basalt	Jasper	Chalcedony	Jasper	Jasper	Chalcedony

Plate 3-8. Projectile points by zone, 45-DO-242.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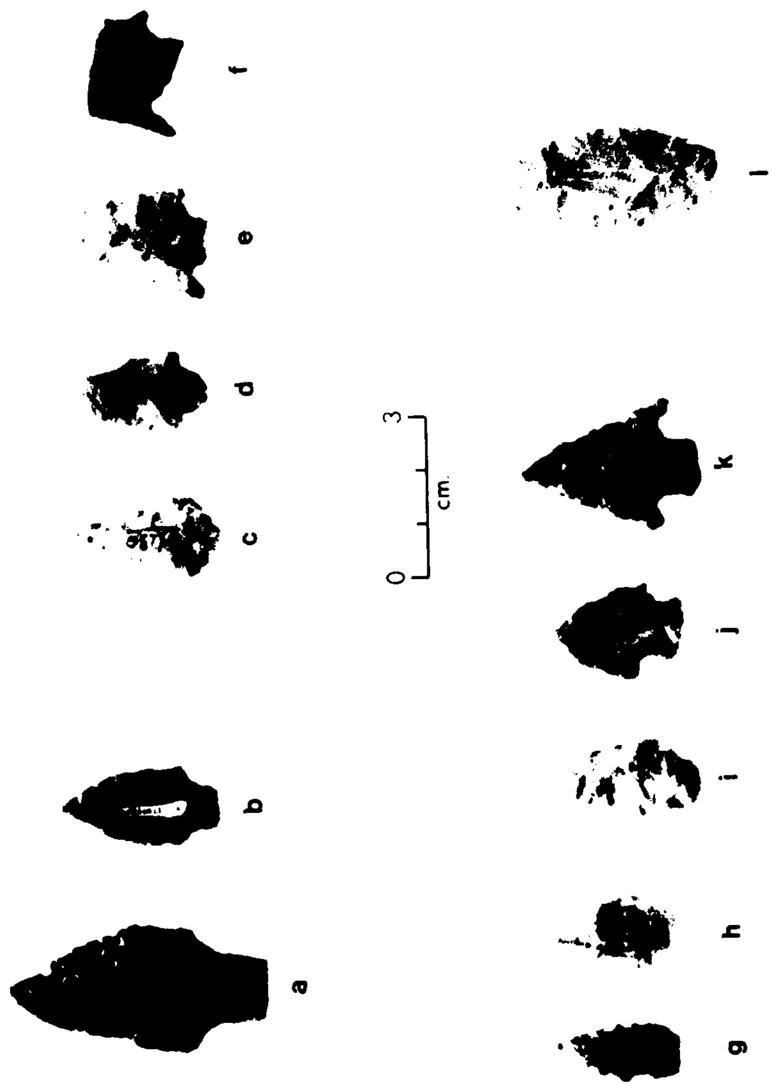
KEY

Master number:
Morphological type:
Historical type:
Provenience/Level:
Zone:
Material:

a.	b.	c.	d.	e.	f.
61	117	130	151	187	114
Type 6	Type 12	Type 7	Type 11	Type 15	Type 15
Mahkin Shouldered	Rabbit Island A	Nespelem Bar	Rabbit Island A	Quilomene Bar Basal-notched A	-
3N2E/FE7/40	10N2E/0	10N2E/40-70	4N10W/FE4/90	13N12E/30	5N12W/FE2/50
1	1	2	2	2	2
Jasper	Chalcedony	Jasper	Jasper	Jasper	Jasper

g.	h.	i.	j.	k.	l.
84	169	2	174	178	98
Type 8	Type 7	Type 13	Type 13	Type 17	Type 5
Nespelem Bar	Nespelem Bar	Nespelem Bar	Columbia Corner-notched A	Quilomene Bar Basal-notched B	Mahkin Shouldered
6N21W/80	7N18W/120	Test Pit 1/40A	12N20E/80	11N20E/80	10N2W/170
3	3	3	3	3	4
Jasper	Opal	Cryptocrystalline Silicate	Chalcedony	Chert	Chert

Plate 3-9. Projectile points by zone, 45-DO-243.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bisecting the blade and haft; width, taken along a horizontal axis passing across the broadest part of the blade or the blade/haft juncture; thickness, taken through the blade/haft juncture. Underlining of measurements indicates that it is an estimate of the original dimension, and the estimate is made only if enough of the form remains to extend the lines, either lateral margins or lateral and basal margins, to a point of intersection.

Specimens are listed by morphological type in the discussion to follow. These morphological types are then related to their historical type assignments, with correlations summarized in tabular form. A summary section will relate the temporal distribution of projectile point types preserved at sites 45-DO-242 and 45-DO-243 to that documented for the Rufus Woods Lake project area and the Columbia Plateau as a whole.

TYPE 1. Large triangular projectile points. N=3

Provenience:	Material:	Measurement:
Zone 13 45-DO-242	Chalcedony	3.6/2.0/.5 cm
Zone 11 45-DO-242	Jasper	4.8/20.0/.6 cm
Zone 11 45-DO-242	Jasper	3.4/2.9/.4 cm

Comment: Two specimens, jasper and a chalcedony, are long, narrow triangles with squared proximal margins. Both show pronounced attrition of lateral edges and indicate considerable resharpening. Both also show chipping and smoothing wear at the tip. The other jasper specimen is a broad, thin triangle with ovate or rounded lateral and basal margins. The lateral margins and tip show attrition, although not as marked as on the two elongate specimens.

All three specimens are cutting and perforating tools rather than blanks or projectile point preforms. All show thinning of the basal margins and some polish, perhaps indicative of use as hafted tools.

Authors refer to these forms as large triangular projectile points with the caveat that they may or may not be confined to that functional category (e.g., Collier et al. 1942, Nelson 1969).

Comparable Specimens: Collier et al. 1942: Plate 11, a,b; Nelson 1969: Figure 44, g-i; Chance and Chance 1982: Figure 150, l.

TYPE 2. Small triangular projectile points. N=2

Provenience:	Material:	Measurement:
Zone 11 45-DO-242	Jasper	1.8/1.3/.4 cm
Zone 11 45-DO-242	Jasper	2.1/1.4/.4 cm

Comment: Both specimens are short, squat, finely flaked forms with straight lateral margins and deeply convex basal margins. Dorsal and ventral sufaces are characterized by the removal of small, narrow pressure flakes. Lateral and dorsal margins show little wear, and that which is present is most probably a residue of manufacture.

These specimens are best described as blanks for small, side-notched projectile points. There is no evidence of wear indicative of hafting, and one may assume that these forms are unfinished, i.e., without characteristic side notches.

Authors refer to these forms as small triangular projectile points or as small, side-notched projectile point blanks (e.g., Collier et al. 1942; Nelson 1969).

Comparable Specimens: Collier et al. 1942: Plate II, e-h; Nelson 1969: Figure 44, d-f; Chance and Chance 1982: Figure 150, I, Figure 151, e.

TYPE 4. Small, side-notched projectile points. N=14

Provenience:		Material:	Measurement:
Zone 11	45-DO-242	Basalt	2.1/1.2/.3 cm
Zone 11	45-DO-242	Jasper	- /1.3/.3 cm
Zone 11	45-DO-242	Jasper	- / - /.4 cm
Zone 11	45-DO-242	Jasper	- / - /.2 cm
Zone 11	45-DO-242	Jasper	- / - /.3 cm
Zone 11	45-DO-242	Petrified Wood	3.8/1.2/.4 cm

Comment: All six specimens have concave basal margins which, coupled with the deep lateral side notches, give the points a distinctive winged appearance. Two complete specimens range in length from 2.1-3.8 cm. Widths vary little, ranging from 1.2-1.3 cm. Thickness ranges from 0.2-0.4 cm. On all six specimens, the dorsal and ventral surfaces have been completely reduced. All reduction appears to have been done by pressure flaking, and all specimens exhibit a regular, usually collateral pattern of fine flake scars extending from the lateral margins to the dorsal and ventral midlines and from the basal margin to the zone of corner notching.

These six specimens fall within the range of variation recognized for "Columbia Plateau Side-notched" projectile points (cf. Swanson et al. 1959; Nelson 1969). Specifically, all six specimens correspond to Nelson's (1969) type variant 10C.

Comparable Specimens: Collier et al. 1942: Plate II, i-o; Nelson 1969: Figure 41, aa-mm; Chance and Chance 1982: Figure 150, a,c,e,f,g,j,m,n, Figure 151, a,b,f,i,m-p, Figure 155, g,i; Greengo 1982: Figure 3.8, a-i.

TYPE 5. Lanceolate projectile points. N=7

Provenience:		Material:	Measurement:
Zone 13	45-DO-242	Basalt	4.9/2.1/.7 cm
Zone 13	45-DO-242	Basalt	5.7/2.1/.4 cm
Zone 12	45-DO-242	Jasper	4.9/2.4/.7 cm
Zone 11	45-DO-242	Jasper	2.7/1.4/.5 cm
Zone 24	45-DO-243	Basalt	5.2/1.4/.4 cm
Zone 24	45-DO-243	Jasper	4.5/1.9/.9 cm
Zone 21	45-DO-243	Jasper	- /2.1/.8 cm

Comment: Specimens classified as Type 5 are variable in form, material, and method of reduction. The four specimens from site 45-DO-242 have irregular lanceolate outlines and very irregular flaking patterns. The two specimens from Zone 24, site 45-DO-243, are regularly flaked and thinned, elongate lanceolate projectile points. All seven specimens have been reduced through pressure flaking but the degree of control over flake removal and resultant outline appears closely tied to material type. That evidence of heat treatment (which would have made the chipping of various stones more uniform) is lacking may explain this variation.

Both specimens from Zone 24, 45-DO-243, appear to be characteristic forms of "Cascade" or "Cold Springs" assemblages (Butler 1962; Nelson 1969; Leonhardy and Rice 1970).

Comparable Specimens: Collier et al. 1942: Plate IV, b,c; Cressman 1960: Figure 41a, A,B,C; Butler 1962: Figure 9, tt. Swanson 1962: Figure 36, g; Leonhardy 1968: Figure 7, h-q; Nelson 1969: Figure 42, l-n, Figure 43, a-m. Leonhardy and Rice 1970: Figure 3, b, Figure 4, a-d, Chance and Chance 1982: Figure 165, d,g,j, Figure 166, a,d, Figure 169 b,c, Figure 170 b,e, Figure 175, a,d, Figure 180, c. Greengo 1982: Figure 3.12, a-n.

TYPE 6. Shouldered lanceolate projectile points. N=5

Provenience:		Material:	Measurement:
Zone 13	45-DO-242	Jasper	3.2/1.6/.5 cm
Zone 12	45-DO-242	Jasper	3.7/1.5/.7 cm
Zone 12	45-DO-242	Chalcedony	3.8/1.4/.5 cm
Zone 13	45-DO-242	Chalcedony	2.8/1.6/.4 cm
Zone 21	45-DO-243	Jasper	4.8/2.3/.6 cm

Comment: Type 6 specimens include at least three distinct forms, separated stratigraphically and spatially. The three specimens from Zone 2, 45-DO-242, are small, shouldered lanceolate forms with well-defined hafting elements or stems. The specimen from Zone 3, 45-DO-242, is a small, shouldered lanceolate form but has a less distinct hafting element

represented by a very slight shoulder on one lateral margin. The specimen from Zone 1, 45-DO-243, is a large, shouldered lanceolate form with angular shoulders and a well-defined stem. All five specimens have been reduced by pressure flaking, although the size, location, and carry of flake scars is variable. All have very irregular flake scar patterns, and uniformly thinned stems.

The specimens exhibit some polish on the stems, which though predominantly confined to the base, does extend part way up the length of the hafting element. Wear or attrition of the lateral margins is minimal. Tips, however, consistently show wear.

This general type has been referred to as "points with slight shoulders and rudimentary stems" (Nelson 1969:113) and as shouldered or stemmed leaf-shaped points (Swanson 1962). It is considered to be a form transitional from lanceolate to stemmed or triangular projectile points and loosely defined within a temporal span of 6500-2000 B.P. (c.f, Nelson 1969; Leonhardy and Rice 1970; Chance and Chance 1982). In the Rufus Woods Lake project area, shouldered lanceolate points have been named Mahkin Shouldered, have a temporal span from at least 5000-3000 B.P., and are considered characteristic of the late Kartar Phase (ca. 5000-4000 B.P.) (cf. Lohse 1984g).

Comparable Specimens: Cressman 1960: Figure 41a, C,D,E; Swanson 1962: Figure 20, m,n; Leonhardy 1968: Figure 7, r,u; Nelson 1969: Figure 37, a-d; Leonhardy and Rice 1970: Figure 3, a,b, Figure 7, d; Chance and Chance 1982: Figure 163, a, Figure 164, b,c,e,h,l, Figure 167, e, Figure 169, b. Greengo 1982: Figure 3.13, a.

TYPE 7. Large sloping shouldered, triangular projectile points with contracting stems. N=4

Provenience:		Material:	Measurement:
Zone 13	45-DO-242	Jasper	4.5/2.1/.7 cm
Zone 13	45-DO-242	Jasper	2.6/1.3/.6 cm
Zone 23	45-DO-243	Opal	3.0/1.4/.7 cm
Zone 22	45-DO-243	Opal	2.9/1.6/.6 cm

Comment: Three distinct forms are present within this Type 7 category. The larger jasper specimen from Zone 3, 45-DO-242, is a broad, elongate triangular form made on a large, thick flake. The chipping pattern, although irregular, is uniform, with flake scars carrying from the margins well into the mid-line of the point. Stem and shoulders are well-defined and symmetrical. The smaller specimen is a short, thick triangular form made on a thick flake or blade. The chipping pattern is more irregular, with one flake scar carrying completely across the bowed surface of the point. The stem incorporates the original striking platform of the flake.

The two specimens from Zone 3 and Zone 2, 45-DO-243, are more uniform, closely similar in outline and flaking. Shoulders are not well-defined and the stems appear only as contracting line segments drawn from nodes low on the lateral margins. Flake scars are long and broad with sufficient depth or force to create a serrated appearance.

None of the specimens show significant wear or attrition of lateral margins or planar surfaces. None show any evidence of resharpening, although the thick, blocky appearance and irregular flaking pattern on the smaller jasper specimen could indicate drastic revision of an original larger form.
Swanson (1962) and Nelson (1969) place similar forms in early Frenchman Springs, a cultural phase beginning about 4000 B.P. and extending up to ca. 2000 B.P. on the middle Columbia River. In general, these forms appear transitional between shouldered lanceolate and characteristic Rabbit Island Stemmed projectile points, and probably date to the earlier part of that time span. These have been termed Nespelem Bar points in the Rufus Woods Lake project area, entering the archaeological record in the latter part of the Kartar Phase at ca. 5000 B.P., and continuing on in time to at least the mid- Hudnut Phase at ca. 3000 B.P. (cf. Lohse 1984g).

Comparable Specimens: Swanson 1962: Figure 20 m, n; Nelson 1969: Figure 37, b, Figure 41, u; Chance and Chance 1982: Figure 158, q, Figure 172, f,g, Figure 174, b.

TYPE 8. Small, sloping shouldered, triangular projectile points with contracting stems. N=1

Provenience:	Material:	Measurement:
Zone 12 45-DO-242	Opal	2.6/1.3/.6 cm

Comment: This specimen is a thick, elongate form made on a large flake. Chipping is irregular and the size, shape, and carry of flake scars varies greatly. Both the dorsal and ventral surfaces have been completely reduced, although inconsistencies in the stone structure have caused a rough, unfinished appearance. The stem has been carefully thinned by detachment of large, broad flakes from both the dorsal and ventral lateral margins.

Similar forms are placed in the early Frenchman Springs Phase, or from about 4000-3000 B.P. (Swanson 1962; Nelson 1969). Classified as Nespelem Bar variants, these forms actually have a much broader distribution, recorded throughout the two thousand year span of the Hudnut Phase (ca. 4000-2000 B.P.) in the Rufus Woods Lake project area (cf. Lohse 1984g).

Comparable Specimens: Nelson 1969: Figure 41, d; Chance and Chance 1982: Figure 168, d, Figure 179, d; Greengo 1982: Figure 3.6, a,e,f,k; Sanger 1970: Figure 22, n.

TYPE 11. Large, square shouldered, triangular projectile points with contracting stems. N=7

Provenience:		Material:	Measurement:
Zone 13	45-DO-242	Jasper	3.8/1.9/.8 cm
Zone 13	45-DO-242	Jasper	2.8/1.5/.6 cm
Zone 13	45-DO-242	Chalcedony	3.7/2.1/.5 cm
Zone 12	45-DO-242	Opal	3.2/1.5/.6 cm
Zone 11	45-DO-242	Chalcedony	3.4/1.8/ - cm
Zone 22	45-DO-243	Jasper	2.8/1.7/.6 cm
Zone 22	45-DO-243	Jasper	2.9/1.6/.6 cm

Comment: Three of the specimens from 45-DO-242 are asymmetrical, with only a single defined shoulder. Two of the specimens show extensive nibbling and wear polish on the lateral edge opposite the shoulderless margin. One specimen is asymmetrical due to a longitudinal snap that removed a shoulder. That snap break was then reworked into a steep, dull edge by removal of short, broad flakes from the dorsal and ventral surfaces. On the other, asymmetry was produced by introduction of only one shoulder during flaking. Neither specimen shows any evidence of hafting, i.e., both lack wear or polish on the stem and both exhibit thick striking platform remnants at the base. The other specimens from 45-DO-242 and 45-DO-243 have well-defined shoulders and stems. Lateral and basal margins show no pronounced wear (nibbling or polish), although the opal specimen does exhibit polish at the tip. One jasper specimen was most probably aborted during manufacture when a break occurred that removed both the tip and a portion of one lateral margin. All of the specimens show irregular flake scar patterns consisting of combinations of short and long, broad and thin flakes removed from different directions off the lateral margins. All appear to have been made on large, thick flakes with pronounced bulbs of percussion. In at least one instance, the large, asymmetrical jasper specimen, the form was made on a thick primary flake, as indicated by the presence of cortex on the dorsal surface.

All seven specimens are considered indicative of the Frenchman Springs Phase (ca. 4000-2000 B.P.) (cf. Swanson 1962; Nelson 1969). The majority are not typical "Rabbit Island Stemmed" forms, overlapping defined variants of Nespelem Bar and Rabbit Island types.

Comparable Specimens: Collier et al. 1942: Plate III, a,b,c; Nelson 1969: Figure 37, e-k, Figure 41, b-d; Chance and Chance 1982: Figure 157, b, Figure 161, e; Greengo 1982: Figure 3.5, g-j, m-p.

TYPE 11. Large, square shouldered, triangular projectile points with contracting stems. N=7

Provenience:		Material:	Measurement:
Zone 13	45-DO-242	Jasper	3.8/1.9/.8 cm
Zone 13	45-DO-242	Jasper	2.8/1.5/.6 cm
Zone 13	45-DO-242	Chalcedony	3.7/2.1/.5 cm
Zone 12	45-DO-242	Opal	3.2/1.5/.6 cm
Zone 11	45-DO-242	Chalcedony	3.4/1.8/ - cm
Zone 22	45-DO-243	Jasper	2.8/1.7/.6 cm
Zone 22	45-DO-243	Jasper	2.9/1.6/.6 cm

Comment: Three of the specimens from 45-DO-242 are asymmetrical, with only a single defined shoulder. Two of the specimens show extensive nibbling and wear polish on the lateral edge opposite the shoulderless margin. One specimen is asymmetrical due to a longitudinal snap that removed a shoulder. That snap break was then reworked into a steep, dull edge by removal of short, broad flakes from the dorsal and ventral surfaces. On the other, asymmetry was produced by introduction of only one shoulder during flaking. Neither specimen shows any evidence of hafting, i.e., both lack wear or polish on the stem and both exhibit thick striking platform remnants at the base. The other specimens from 45-DO-242 and 45-DO-243 have well-defined shoulders and stems. Lateral and basal margins show no pronounced wear (nibbling or polish), although the opal specimen does exhibit polish at the tip. One jasper specimen was most probably aborted during manufacture when a break occurred that removed both the tip and a portion of one lateral margin. All of the specimens show irregular flake scar patterns consisting of combinations of short and long, broad and thin flakes removed from different directions off the lateral margins. All appear to have been made on large, thick flakes with pronounced bulbs of percussion. In at least one instance, the large, asymmetrical jasper specimen, the form was made on a thick primary flake, as indicated by the presence of cortex on the dorsal surface.

All seven specimens are considered indicative of the Frenchman Springs Phase (ca. 4000-2000 B.P.) (cf. Swanson 1962; Nelson 1969). The majority are not typical "Rabbit Island Stemmed" forms, overlapping defined variants of Nespelem Bar and Rabbit Island types.

Comparable Specimens: Collier et al. 1942: Plate III, a,b,c; Nelson 1969: Figure 37, e-k, Figure 41, b-d; Chance and Chance 1982: Figure 157, b, Figure 161, e; Greengo 1982: Figure 3.5, g-j, m-p.

TYPE 12. Small, square shouldered, triangular projectile points with contracting stems. N=1

Provenience:	Material:	Measurement:
Zone 21 45-DO-243	Chalcedony	3.0/1.5/.5 cm

Comment: This specimen is a short, elongate triangular form made on a broad, thick flake. Both the dorsal and ventral surfaces have been completely reduced, although the bulb of percussion and original curvature of the flake are apparent. The flake scar pattern is irregular, with flake size, carry, and direction of removal quite variable. The lateral margins exhibit extensive nibbling and the base shows some polish or smoothing wear.

This specimen was probably hafted, but wear along the margins indicates its use as a multi-functional tool.

This specimen is a typical Rabbit Island Stemmed point, considered characteristic of the Frenchman Springs Phase (Nelson 1969), and dated to about 4000-2000 B.P. in the Wanapum Dam reservoir. In the Rufus Woods Lake project area, this variant of Rabbit Island Stemmed is a hallmark of the Hudnut Phase (ca. 4000-2000 B.P.) (Lohse 1984g).

Comparable Specimens: Collier et al. 1942: Plate III, a-d; Nelson 1969: Figure 37, j, Figure 40, jj, Figure 41, e; Chance and Chance 1982: Figure 176, a; Greengo 1982: Figure 3.5, g-j, Figure 3.6, j; Sanger 1970: Figure 22, O; Cressman 1960: Figure 41b, D,E.

TYPE 13. Large, square shouldered, triangular projectile points with expanding and straight stems. N=16

Provenience:		Material:	Measurement:
Zone 13	45-DO-242	Jasper	3.2/2.0/.6 cm
Zone 13	45-DO-242	Jasper	2.5/1.9/.6 cm
Zone 13	45-DO-242	Jasper	- /1.9/.5 cm
Zone 13	45-DO-242	Jasper	3.0/2.1/.6 cm
Zone 13	45-DO-242	Jasper	2.3/2.2/.5 cm
Zone 13	45-DO-242	Jasper	4.5/2.0/.6 cm
Zone 13	45-DO-242	Jasper	- /2.2/.6 cm
Zone 13	45-DO-242	Chalcedony	2.9/1.6/.5 cm
Zone 13	45-DO-242	Chalcedony	2.7/1.5/.5 cm
Zone 13	45-DO-242	Chalcedony	3.0/2.2/.7 cm
Zone 13	45-DO-242	Chalcedony	2.6/1.6/.5 cm
Zone 13	45-DO-242	Opal	2.9/2.1/.6 cm
Zone 13	45-DO-242	Jasper	3.7/2.1/.7 cm
Zone 12	45-DO-242	Jasper	3.0/1.8/.5 cm
Zone 23	45-DO-243	Chalcedony	2.4/1.8/.5 cm
Zone 21	45-DO-243	Opal	3.0/1.6/.6 cm

Comment: These specimens constitute a fairly narrow morphological range, wherein variation is best represented as two separate groups based on the presence of a straight stem versus an expanding stem. In general, length, width, and thickness measurements are quite close (length: x=3.0 cm, s=.564 cm, v=.296 cm; width: x=1.9 cm, s=.239 cm, v=.054 cm; thickness: x=.60 cm, s=.070 cm, v=.005 cm), irrespective of material type or stratigraphic position. Edge attrition is light or imperceptible on most specimens. Invariably, however, broken or reworked specimens show some edge wear and exhibit nibbling at the base of the stem or within the notch, probably indicative of their use as hafted tools. Flaking patterns are quite variable, ranging from random patterns of large and small flakes removed from many different directions along the margins to evenly spaced collateral patterns incorporating uniform flake scar size and carry. All specimens have well-defined shoulders and stems, although stem treatment does vary from straight to expanding and from broad to narrow. All stems have been carefully thinned; the thinning flakes range from short and wide to long and thin.

These specimens represent a large corner-notched projectile point class held to be representative of a period ranging from about 4000-2000 B.P. and called variously the "Frenchman Springs Phase" (Nelson 1969) or the "Tucannon Phase" (Leonhardy and Rice 1970). These forms crosscut a number of defined historical types, including Columbia Corner-notched, Quilomene Bar Corner-notched, and Nespelem Bar, and date the same temporal period as the Rabbit Island Stemmed point type (Swanson 1962; Nelson 1969). However, in the Rufus Woods Lake Reservoir the Columbia Corner-notched and Rabbit

Island Stemmed points are not found in comparable numbers in any given site assemblage (cf. Lohse 1984). It is important to note, in this regard, that 45-DO-242 is the only site in the reservoir where the Columbia Corner-notched type is dominant.

Comparable Specimens: Collier et al. 1942: Plate III, l-o; Leonhardy 1968: Figure 8, f-k; Nelson 1969: Figure 38, g-k; Chance and Chance 1982: Figure 152, d, Figure 161, a, Figure 163, d, Figure 174, a; Greengo 1982: Figure 3.4, q-v.

TYPE 14. Small, square shouldered, triangular projectile points with expanding and straight stems. N=5

Provenience:		Material:	Measurement:
Zone 13	45-DO-242	Jasper	3.3/1.1/.4 cm
Zone 13	45-DO-242	Chalcedony	- / - /.5 cm
Zone 13	45-DO-242	Chalcedony	2.9/1.2/.4 cm
Zone 13	45-DO-242	Jasper	- /2.1/.4 cm
Zone 12	45-DO-242	Chalcedony	3.1/1.1/.4 cm

Comment: Three of these specimens are elongate, slender triangular forms retaining the original flake curvature. Although both dorsal and ventral surfaces are completely reduced, the bulb of percussion is readily apparent as a thick swelling at the proximal end. That most of the flake was utilized is evidenced in the long, thin, delicate tip created at the distal end. In all three examples, the flake scar pattern is fine and even, tending toward collateral on at least one surface. Lateral and basal margins are ragged and worn, with nibbling or smoothing at the base, and crushing at the tip. One specimen also exhibits extensive wear along the inside of the corner notches. The other two specimens are more similar to the Type 13 forms discussed above, and are classified as Type 14 only because of their smaller size (if complete, they may easily have fallen into the larger range). Both are crudely flaked, with variable flake scar size, carry, and direction of removal. The jasper specimen was, in fact, only flaked extensively along the lateral and basal margins. Intact margins show wear patterns similar to those observed on the other three Type 14 specimens: nibbling on both the lateral and basal edges.

The co-occurrence of these specimens with those described as Type 13 clearly demonstrates a close cultural/temporal association noted elsewhere in the Rufus Woods Lake project area (cf. Lohse 1984). The three slender specimens are characteristic of a variant of Columbia Corner-notched, most often found in Coyote Creek Phase assemblages dating after ca. 2000 B.P.

Nelson (1969) and Chance and Chance (1982) record similar formal associations indicative of a period from about 4000-2000 B.P. ("Frenchman Springs Phase" or "Ksunku Period").

Comparable Specimens: Collier et al. 1942: Plate III, h,i; Cressman 1960: Figure 41a, L, Figure 41b, E; Rice 1969: Figure 33, A; Nelson 1969: Figure 41, l-m, oo-rr; Chance and Chance 1982: Figure 155, e, Figure 156, b; Greengo 1982: Figure 3.4, d,f,h-j,l-m.

TYPE 15. Large, barbed triangular projectile points with contracting stems. N=7

Provenience:		Material:	Measurement:
Zone 13	45-DO-242	Jasper	- /2.4/.6 cm
Zone 13	45-DO-242	Jasper	- /2.0/.6 cm
Zone 13	45-DO-242	Chalcedony	- /2.3/.5 cm
Zone 13	45-DO-242	Jasper	2.9/2.1/.6 cm
Zone 11	45-DO-242	Jasper	3.1/2.1/.5 cm
Zone 22	45-DO-243	Jasper	- /2.3/.5 cm
Zone 22	45-DO-243	Jasper	3.1/2.1/.6 cm

Comment: All seven specimens are very similar morphologically. They are broad in relation to length, have an irregular flaking pattern, and exhibit fine, delicate barbs. Both the dorsal and ventral surfaces have been completely reduced. Flake size, carry, and direction of removal varies, but the pattern tends toward collateral. One specimen shows delicate serrations along the lateral margins. Stems have been carefully shaped and thinned on all specimens. The original bulb of percussion has been incorporated into the blade haft juncture/stem on all examples. Two specimens retain remnants of striking platforms as the bases of stems. Four specimens exhibit lateral snaps above the blade/haft juncture. On one, breakage is represented by impact fractures at both the midpoint of the blade and the distal portion of the stem. General attrition of the lateral and basal margins is present on most of the specimens; in at least two examples, however, this appears to be the result of edge grinding during manufacture rather than wear with use. Two of the three specimens with intact margins show some crushing or polish at the tips. Several of the stems and notches exhibit nibbling along the margins, perhaps indicative of hafting.

These specimens, as a type, are not well described in literature detailing Columbia Plateau prehistory. Nelson (1969:304-305) illustrates a similar specimen which he refers to simply as a miscellaneous or undesignated Type 5 stemmed projectile point assignable to a Cayuse I subphase assemblage (ca. 2000-900 B.P.). Leonhardy and Rice (1970:16) illustrate similar forms, albeit with expanding rather than contracting stems, as typical of the "Harder Phase" (ca. 2500-600 B.P.). Within defined types and type

assemblages, this form is probably best related to the Quilomene Bar type series (cf. Nelson 1969). This type is initially found in association with "Rabbit Island Stemmed" projectile points in the "Frenchman Springs Phase" and later with "Columbia Stemmed" series projectile points in the "Cayuse Phase." During the intervening "Quilomene Bar Phase" and later, it usually appears as basally notched, with an expanding stem (cf. Swanson 1962; Nelson 1962b). The presence of a contracting stem on the specimens from 45-DO-242 and 45-DO-243, and their association with radiocarbon dates ranging from 3912±459 B.P. (TX-4174) to 3066±232 B.P. (TX-4176), may indicate that these forms are ancestral to the defined Quilomene Bar series, forms contemporary with the early "Rabbit Island Stemmed" projectile points and characteristic of the early Hudnut Phase (ca. 4000-3000 B.P.). In this regard, it is intriguing that the five specimens were assigned to four separate historical types: Rabbit Island Stemmed, Columbia Corner-notched, Quilomene Bar Corner-notched, and Quilomene Bar Basal-notched (Tables 3-23 and 3-24). This may well support the idea that these forms are transitional, that they represent morphological variation that emerges later in the Quilomene Bar series, and documents a direct historical tie between earlier and later stemmed projectile point types.

Comparable Specimens: Collier et al. 1942: Plate III, r; Cressman 1960: Figure 41b, H-J; Nelson 1969: Figure 38, t; Sanger 1970: Figure 22, h,k,m; Chance and Chance 1982: Figure 163, d, Figure 167, d; Greengo 1982: Figure 3.5, h,m,n, Figure 3.7, e.

TYPE 17. Large, barbed, triangular projectile points with straight and expanding stems. N=3

Provenience:		Material:	Measurement:
Zone 13	45-DO-242	Chalcedony/Agate	3.5/2.3/.5 cm
Zone 11	45-DO-242	Jasper	- /2.8/.4 cm
Zone 23	45-DO-243	Jasper	3.3/2.5/.7 cm

Comment: All three specimens are broad, squat, triangular forms with straight to very slightly expanding stems. The dorsal and ventral surfaces on both jasper specimens have been completely reduced through removal of largish flakes taken from the lateral and basal margins in toward the midline of the points. Reduction of the chalcedony/agate form is more uneven, with flaking on the dorsal and ventral surfaces partly confined to the lateral margin.

Wear or attrition on the margins of all three specimens is slight, if present at all. However, the two specimens from 45-DO-242 do show some polish or nibbling on the inside of the corner notches, perhaps indicative of hafting. Flaking patterns are irregular, consisting of large, broad flakes removed from various directions on the dorsal and ventral surfaces.

These forms differ from those described as Type 15 above primarily in that they are longer and broader, with non-contracting stems. Also, the flaking patterns are less regular and involve removal of larger pressure flakes.

These specimens are characteristic of defined "Quilomene Bar Basal-notched" forms, but again, without the characteristic notch at the base of the stem (cf. Nelson 1969). Comparable specimens are plentiful in the literature, and have been recorded in contexts dated from about 4000 to 0 B.P. (e.g., Nelson 1969; Leonhardy and Rice 1970; Chance and Chance 1982; Greengo 1982). In the Rufus Woods Lake project area, Quilomene Bar Basal-notched points occur from the latter part of the Hudnut Phase (ca. 2500-2000 B.P.) up into the Coyote Creek Phase (post-2000 B.P.) (cf. Lohse 1984g).

Comparable Specimens: Collier et al. 1942: Plate III, p-s,w,x; Cressman 1960: Figure 41b, J,K,L; Leonhardy 1968: Figure 8, a-c; Nelson 1969: Figure 38 a-f; Rice 1969: Figure 32, A; Sanger 1970: Figure 21, o-q, Figure 22, h-l; Chance and Chance 1982: Figure 154, d, Figure 158, e,f, Figure 163, d; Greengo 1982: Figure 3.4, s, Figure 3.7, c-h.

DETACHED STEMS. N=19

Provenience:		Material:	Measurement:
Zone 13	45-DO-242	Jasper	- /1.2/.5 cm
Zone 13	45-DO-242	Jasper	- /2.1/.7 cm
Zone 13	45-DO-242	Jasper	- / - /.5 cm
Zone 13	45-DO-242	Obsidian*	- / - /.7 cm
Zone 13	45-DO-242	Chalcedony	- / - / - cm
Zone 13	45-DO-242	Chalcedony	- / - / - cm
Zone 13	45-DO-242	Jasper	- / - / - cm
Zone 13	45-DO-242	Chalcedony	- / - / - cm
Zone 13	45-DO-242	Chalcedony	- / - /.5 cm
Zone 12	45-DO-242	Chalcedony	- / - / - cm
Zone 12	45-DO-242	Jasper	- / - /.6 cm
Zone 12	45-DO-242	Opal	- / - / - cm
Zone 11	45-DO-242	Jasper	- /1.3/.3 cm
Zone 11	45-DO-242	Jasper	- / - / - cm
Zone 11	45-DO-242	Jasper	- / - / - cm
Zone 11	45-DO-242	Jasper	- / - / - cm
Zone 11	45-DO-242	Jasper	- / - / - cm
Zone 11	45-DO-242	Chalcedony	- /1.0/.3 cm
Zone 22	45-DO-243	Argillite	- / - / - cm

Comment: All nineteen specimens are classified as stems because of the presence of a blade/haft juncture or overall configuration. All have been carefully shaped and thinned through pressure flaking. Those classified

assigned to a morphological type have either a well-defined shoulder or side notches. Most were probably broken during use, indicated by nibbling or wear on the lateral and basal margins or by the degree of finishing. Only two examples, both Type 4 side-notched forms, were snapped during manufacture, indicated by the presence of a single notch and a snap through the area of the corresponding notch on the opposite lateral margin.

The obsidian specimen (marked by an asterisk above) is the only one which may or may not actually be a stem. It is large enough to be a base for a lanceolate form; however, the presence of a small constriction on one lateral margin, terminated by a lateral snap, seems to be the remnant of a side notch, which would identify this fragment as a stem rather than a base. This probable Cold Springs Side-notched point from Zone 13 at 45-DO-242, in conjunction with the recovered Cascade point and two Mahkin Shouldered points, reinforces the possibility of an ill-defined Kartar Phase occupation in that zone.

The nine specimens assigned to historic types duplicate forms identified among the whole projectile points. These are diagnostic of cultural occupations spanning at least the last 4,000-3,000 years (e.g., Quilomene Bar Corner-notched, Columbia Stemmed, and Columbia Side-notched series).

DETACHED BASES. N=3

Provenience:		Material:	Measurement:
Zone 13	45-DO-243	Chalcedony/Agate	- / - /.6 cm
Zone 23	45-DO-243	Argillite	- / - /.5 cm
Zone 22	45-DO-243	Jasper	- / - /.5 cm

Comment: All three specimens are probable lanceolate bases with contracting lateral margins and straight basal margins. All have irregular flake scar patterns, with reduction concentrated at the lateral and basal edges. Both specimens from 45-DO-242 are edge ground. All three were reduced through pressure flaking, and are carefully shaped and thinned.

These specimens are quite similar to bases observed on both simple lanceolate and shouldered lanceolate forms discussed previously. They are not Cascade forms and correlate best with the formal variation noted under the Mahkin Shouldered Type, or perhaps, the Nespelem type, and within the Rufus Woods project area, diagnostic of a period ranging from about 5000-3000 B.P. (cf. Lohse 1984g).

Comparable Specimens: None. Illustrated examples of Type 5 and 6 projectile points, cited previously, are appropriate.

BLADE SEGMENTS. N=8

Provenience:	Material:	Measurement:
Zone 13 45-DO-242	Jasper	3.8/1.4/.6 cm
Zone 13 45-DO-242	Chalcedony	3.0/ - /.4 cm
Zone 13 45-DO-242	Jasper	- /1.9/.4 cm
Zone 12 45-DO-242	Chalcedony	- /1.6/.3 cm
Zone 12 45-DO-242	Chalcedony	- / - /.3 cm
Zone 11 45-DO-242	Jasper	1.9/1.3/.3 cm
Beach 45-DO-242	Chalcedony	4.4/1.6/.4 cm
Beach 45-DO-242	Jasper	- / - /.4 cm

Comment: At least five separate morphological types are included in the eight blade segments. The lanceolate specimen from Zone 3, 45-DO-242, looks very much like a classic Cascade form, with small serrations on one lateral margin near the haft or base. Although completely reduced on both the dorsal and ventral surfaces, this form still retains the curvature of the original flake or blade, and a thick swelling at the proximal end may represent the original bulb of percussion. Most of both the dorsal and ventral surface is encrusted with a brown deposit. Interestingly, the lateral snap at the tip is also covered with this deposit, while a series of four small flake scars on one lateral margin, dorsal surface, and the diagonal snap through the base are not so encrusted. It may be that this specimen was curated by site inhabitants, i.e., collected as a relic and partially modified. Two other specimens, one classified as a Type 13 projectile point, are wide, corner-notched, triangular forms. Both are from Zone 3, 45-DO-242, and are associated with cultural features. Neither may have been a completed form, since dorsal and ventral surfaces are not completely reduced, and lateral and basal margins are not uniformly shaped. The Type 4, small side-notched projectile point from Zone 1, 45-DO-242, is also not a completed form, and appears to have been discarded after the occurrence of a lateral snap through the stem during introduction of a notch on one lateral margin. Another specimen from Zone 2, 45-DO-242, may also have been abandoned during manufacture. It is a small, delicate, barbed form, with a long, vertical snap, which removed the base or stem and most of the blade and tip. The two specimens from the beach are elongate, thin triangular forms. One has well-defined shoulders and a detached stem. The other was broken at or just above the blade/haft juncture. Both probably were broken during use, given their uniform shape and the occurrence of wear or attrition on their lateral margins and tips.

The Cascade-like form from Zone 3, 45-DO-242, and the two specimens collected from the beach in front of 45-DO-242, are distinct from other classified morphological types at this site. The other specimens are quite easily subsumed under the described types.

Ignoring the probable curated specimen, these projectile points indicate cultural occupations during the last 4,000-3,000 years. Nelson (1969) assigns similar forms to "Frenchman Springs Phase" (ca. 4000-2000 B.P.) and the "Cayuse Phase" (ca. 2000-0 B.P.).

Comparable Specimens: None. Illustrated examples of Type 4, 5, and 13 projectile points, presented previously, are appropriate.

REWORKED AND UNFINISHED PROJECTILE POINT FORMS. N=4

Provenience:		Material:	Measurement:
Zone 13	45-DO-242	Jasper	4.7/2.4/.5 cm
Zone 13	45-DO-242	Chalcedony/Agate	2.0/ - /.5 cm
Zone 12	45-DO-242	Chalcedony	2.9/1.6/.8 cm
Zone 12	45-DO-242	Basalt	4.2/2.5/.6 cm

Comment: Two of these specimens were aborted during manufacture, prior to completion of the final form. The large jasper specimen is a large, elongate, triangular preform. One lateral margin has been notched, forming a well-defined barb. Small, evenly spaced pressure flakes have been removed from that barb up along the lateral margin to the tip. The opposite margin also has been reduced but not so uniformly nor completely as the side with the barb. The corner of the base opposite the barb has not been modified beyond the initial creation of the triangular form. Neither lateral margin nor the basal margin show any wear or attrition. The chalcedony/agate specimen has been roughed out into a triangular form with sloping shoulders and a contracting stem but the dorsal and ventral surfaces have not been uniformly reduced. The intact lateral margin has been chipped along the dorsal surface only and still shows grinding preparatory to the removal of further flakes. A large, diagonal snap which removed most of the opposite margin probably made the maker of the specimen dispose of it. The other chalcedony specimen appears to have been aborted with the occurrence of two breaks that removed both shoulders at the blade/haft juncture. Breakage also appears to have entailed a large part of the upper blade, but this was compensated for with extensive reworking of the lateral margins and tip. The basalt specimen has markedly incurvate lateral margins which may or may not represent drastic revision of the original form. The tip does show some wear or polish which may be indicative of use of this artifact as a drill or perforator; however, the presence of a well-defined stem and shoulders may indicate prior use as a projectile point.

All of these specimens fall readily into morphological types previously described for site 45-DO-242. None are particularly diagnostic, but together, do place cultural occupations in a period ranging from about 4000-2000 B.P. or the Hudnut Phase defined for the Rufus Woods Lake project area.

Comparable Specimens: None. Illustrated examples of Type 8, 11, and 15 projectile points, cited previously, are correlates.

RELATIONSHIP OF MORPHOLOGICAL AND HISTORICAL TYPES

Cross-tabulations of morphological and historical projectile point types are presented in Tables 3-23 and 3-24. As shown, there is a close correspondence between designated morphological types and defined types with acknowledged historical sensitivity. All small side-notched specimens were assigned to the Plateau Side-notched type. Simple lanceolate forms fall into Cascade type variants and the Mahkin Shouldered lanceolate category. All shouldered lanceolate points are assigned to Mahkin Shouldered. Large and small sloping shouldered triangular points with contracting stems are placed in the Nespelem Bar type. Large and small square-shouldered triangular points with contracting stems are characteristic Nespelem Bar and Rabbit Island Stemmed varieties. Large and small square-shouldered triangular points with expanding and straight stems are assigned to four major historical type series: Nespelem Bar, Rabbit Island Stemmed, Columbia Corner-notched, and Quilomene Bar Corner-notched. However, the majority of these specimens (57%) are characteristic of the Columbia Corner-notched type. Large, barbed triangular projectile points with contracting stems include variants of Rabbit Island Stemmed, Columbia Corner-notched, and Quilomene Bar Corner-notched types. Large, barbed triangular points with straight and expanding stems are classified as Quilomene Bar Basal-notched or Wallula Rectangular Stemmed types.

The morphological classes that are most recalcitrant to assignment to recognized historical types are, of course, the large and small triangular points with square shoulders and straight to expanding stems. As pointed out previously, we are prepared to argue that this may well reflect a historical transition linking earlier and later projectile point type series. It seems entirely probable that a) the Columbia Corner-notched and Quilomene Bar Corner-notched categories are related type series, and b) that the later Quilomene Bar Basal-notched form is a direct outgrowth of these variants, as is the smaller Columbia Corner-notched variety that continues on into the period from about 2000-200 B.P. Other examples with variable, not clear-cut distinctions, include the Nespelem Bar and Rabbit Island Stemmed varieties. Other researchers (e.g., Nelson 1969) have speculated that large shouldered lanceolate and large shouldered triangular points are forerunners of the distinctive Rabbit Island Stemmed projectile point type. This seems to be the case in the Rufus Woods Lake project area, where late Kartar Phase assemblages (ca. 5000-4000 B.P.) contain both Mahkin Shouldered and Nespelem Bar types. These appear to overlap in morphological attributes, with the primary distinction in the most closely related specimens being a lanceolate outline versus a triangular outline. After ca. 4000 B.P., the Mahkin Shouldered point diminishes in frequency and the Nespelem Bar point becomes smaller, with variable shoulder configuration, but shows considerable overlap with

established Rabbit Island Stemmed varieties. In the Hudnut Phase (ca. 4000-2000 B.P.), both types are replaced by the defined Rabbit Island Stemmed series and the Columbia Corner-notched type. We may well be observing a historical transition resulting in the modification of related projectile point forms, which, in fact, continues into the Coyote Creek Phase (ca. 2000-200 B.P.) with the continued popularity of Columbia Corner-notched variants and the Quilomene Bar Corner-notched and Quilomene Bar Basal-notched series.

TEMPORAL DISTRIBUTION

Tables 3-25 and 3-26 show the distribution of historical projectile point types by analytic zone at sites 45-DO-242 and 45-DO-243. As shown, the two site assemblages represent at least the last five thousand years of known occupation in the project area. Plates 3-6 through 3-9 illustrate selected projectile point types recovered from 45-DO-242 and 45-DO-243, arranged by analytic zone and cultural feature.

Zone 24, 45-DO-243 with its Cascade B and Mahkin Shouldered points represents the earliest occupation at either site. Zone 14, 45-DO-242 may be contemporary, but no diagnostic artifacts were recovered. A single Cascade A point, two Mahkin Shouldered, and the probable Cold Springs Side-notched base recovered from Zone 13, 45-DO-242 likely signal a poorly defined late Kartar Phase occupation at that site.

The most intensive cultural occupations occurred in Zone 13, 45-DO-242, where 15 cultural features, including three housepits, three firepits, and six other pits, were uncovered in association with 51 projectile points and projectile point fragments. These points are generally large and corner-notched with both contracting and expanding stems. Radiocarbon dates from the floor of Housepit 2 range from 3066±232 B.P. (TX-4176) to 3912±459 B.P. (TX-4174), and yield an approximate beginning date for the formation of Zone 13. These early occupations are characterized by Columbia Corner-notched A projectile points, although a number of Nespelem Bar specimens also occur, as well as the Cascade A, Mahkin Shouldered, and probable Cold Springs Side-notched noted above. Later occupations within that same zone produced a wider variety of forms, including Rabbit Island Stemmed and Quilomene Bar Corner-notched and Quilomene Bar Basal-notched specimens.

Zone 12 at 45-DO-242, and Zones 23, 22 and 21 at 45-DO-243, produced a similar range of projectile point types, but without the preponderance of Columbia Corner-notched A points recovered from Zone 13 at 45-DO-242. The radiocarbon date from upper Zone 12, 45-DO-242 places cultural occupation at about 914±86 B.P. (TX-4175). This compares to a radiocarbon date of 1512±64 B.P. (TX-4034) from upper Zone 22, 45-DO-243. These dates are outside the temporal range established for the Mahkin Shouldered, Nespelem Bar, and Rabbit Island Stemmed types. The position of the dates, near the upper boundaries of Zone 12 and 22, probably indicates that both zones are a mixing of older and later occupations. However, it is also possible that the distribution of projectile point types and radiocarbon dates does correlate due to intensive disturbance of the cultural deposits. This appears particularly likely given

Table 3-23. Relationship of morphological types to historical types, 45-DO-242.

Historical Type	Morphological Type												Total
	1	2	4	5	6	7	8	11	13	14	15	17	
Cascade A	-	-	-	2	-	-	-	-	-	-	-	-	2
Mahkin Shouldered	-	-	-	1	3	-	-	-	-	-	-	-	4
Plateau Side-notched	-	-	6	-	-	-	-	-	-	-	-	-	6
Nespelem Bar	-	-	-	-	-	2	1	3	1	-	-	-	7
Rabbit Island A	-	-	-	-	-	-	-	1	-	1	2	-	4
Rabbit Island B	-	-	-	-	-	-	-	1	-	-	-	-	1
Columbia Corner-notched A	-	-	-	-	-	-	-	-	7	1	2	-	10
Quilomene Bar Corner-notched	-	-	-	-	-	-	-	-	5	-	1	-	6
Columbia Corner-notched B	-	-	-	-	-	-	-	-	1	3	-	-	4
Wallula Rectangular-stemmed	-	-	-	-	-	-	-	-	-	-	-	1	1
Quilomene Bar Basal-notched A	-	-	-	-	-	-	-	-	-	-	-	1	1
Not Assigned	3	1	-	-	-	-	-	-	-	-	-	-	4
TOTAL	3	1	6	3	3	2	1	5	14	5	5	2	50

Table 3-24. Relationship of morphological types to historical types, 45-DO-243.

Historical Type	Morphological Type									Total
	5	6	7	8	11	12	13	15	17	
Cascade A	1	-	-	-	-	-	-	-	-	1
Cascade B	1	-	-	-	-	-	-	-	-	1
Mahkin Shouldered	1	1	-	-	-	-	-	-	-	2
Nespelem Bar	-	-	2	1	1	-	1	-	-	5
Rabbit Island A	-	-	-	-	1	1	-	-	-	2
Columbia Corner-notched A	-	-	-	-	-	-	1	-	-	1
Quilomene Bar Basal-notched A	-	-	-	-	-	-	-	1	-	1
Quilomene Bar Basal-notched B	-	-	-	-	-	-	-	-	1	1
TOTAL	3	1	2	1	2	1	2	1	1	14

Table 3-25. Stratigraphic distribution of historical projectile point types, 45-DO-242.

Historical Type	Zone						Total
	11		12		13		
	N	%	N	%	N	%	
Cascade A	1	50	-	-	1	50	2
Mahkin Shouldered	-	-	2	50	2	50	4
Plateau Side-notched	6	100	-	-	-	-	6
Nespelem Bar	1	14	2	28	4	57	7
Rabbit Island A	1	25	1	25	2	50	4
Rabbit Island B	-	-	-	-	1	100	1
Columbia Corner-notched A	-	-	-	-	10	100	10
Quilomene Bar Corner-notched	-	-	1	17	5	83	6
Columbia Corner-notched B	-	-	-	-	4	100	4
Wallula Rectangular-stemmed	1	100	-	-	-	-	1
Quilomene Bar Basal-notched A	-	-	-	-	1	100	1
Not Assigned	2	50	-	-	2	-	4
TOTAL	12		6		32		50

Table 3-26. Stratigraphic distribution of historical projectile point types, 45-DO-243.

Historical Type	Zone								Total
	21		22		23		24		
	N	%	N	%	N	%	N	%	
Cascade A	1	100	-	-	-	-	-	-	1
Cascade B	-	-	-	-	-	-	1	100	1
Mahkin Shouldered	1	50	-	-	-	-	1	50	2
Nespelem Bar	2	40	1	20	2	40	-	-	5
Rabbit Island A	1	50	1	50	-	-	-	-	2
Columbia Corner-notched A	-	-	-	-	1	100	-	-	1
Quilomene Bar Basal-notched A	-	-	1	100	-	-	-	-	1
Quilomene Bar Basal-notched B	-	-	-	-	1	100	-	-	1
TOTAL	5		3		4		2		14

the distribution of Cascade, Mahkin Shouldered and Nespelem Bar points throughout the three upper zones at both 45-DO-242 and 45-DO-243. The construction of housepits and other features at 45-DO-242, and possibly, also at 45-DO-243, could be the cause; aboriginal excavations may have moved diagnostics from lower levels up into the later levels.

Zone 11 at 45-DO-242 is the latest occupation at either site, with Plateau Side-notched variants indicative of the very late Coyote Creek Phase (ca. 500-200 B.P.). It does also contain a single Cascade A point, a Nespelem Bar point, and a Rabbit Island Stemmed A point. However, given the radiocarbon date of ca. 900 B.P. from Zone 12 below, and the preponderance of Plateau Side-notched points, as well as a Wallula Rectangular Stemmed point, in the zonal assemblage, we can assign these occupations to the late Coyote Creek Phase with confidence.

While the chronologic sequence at both sites seems relatively straightforward, the actual situation is very complex: the seven analytic zones represent a wide range of cultural occupations and activities. Figure 3-12 below presents a correlation of cultural sequences at both sites, i.e., the relationship of cultural stratigraphy, projectile point types, and radiocarbon dates.

As shown, cultural occupations at the two sites can be related, but they are most assuredly the result of separate activities through time. At any given date, both sites may have been occupied. At certain times, however, the duration and nature of activities at the sites differed markedly--this is particularly true of the contrast between the Zone 13, 45-DO-242 occupation with its housepits and rich cultural assemblage and the paucity of cultural materials recovered from roughly contemporaneous Zones 23 and 22 at 45-DO-243.

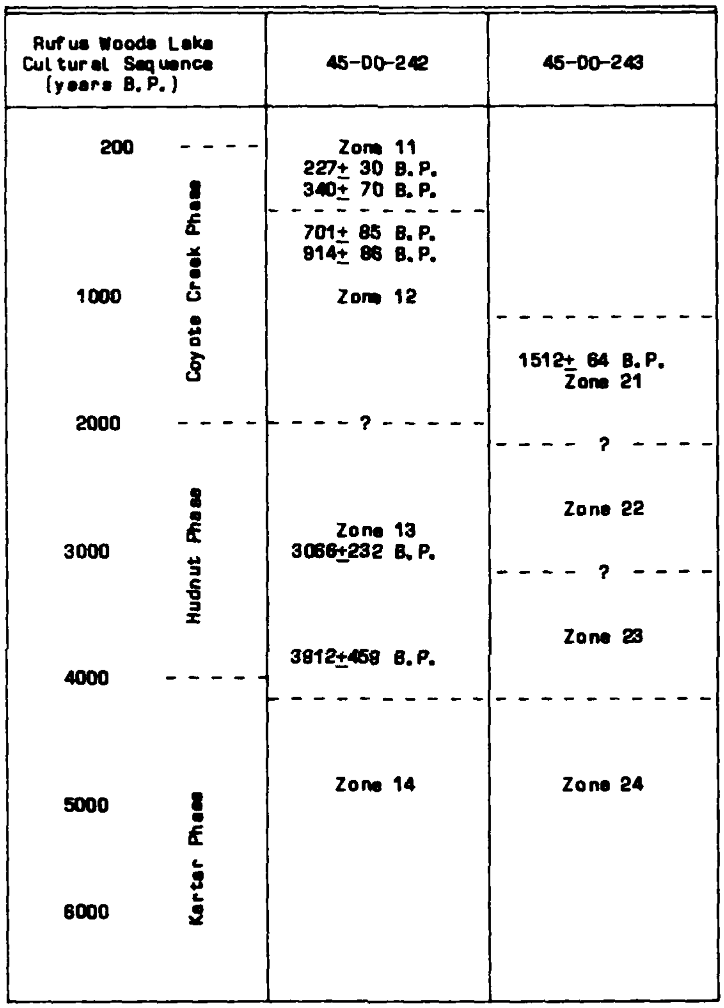


Figure 3-12. Chronological relationship of occupation zones, 45-DO-242 and 45-DO-243.

4. FAUNAL ANALYSIS

Zoological remains from archaeological sites provide a unique source of data on the ecology and historic biogeography of animal species living in the area, and on utilization of faunal resources by human occupants. This chapter describes the faunal assemblage recovered from 45-DO-242 and 45-DO-243, and summarizes the implications of the assemblage for understanding the archaeology of the site.

FAUNAL ASSEMBLAGE

The distribution of faunal remains by zone is summarized for both sites in Tables 2-3 and 2-4. The vertebrate assemblage from 45-DO-242 consists of 58,429 elements weighing 20,927 g and the assemblage from 45-DO-243 consists of 6,494 elements weighing 2,791 g. Of the total 45-DO-242 assemblage, 1,707 elements (about 3%) were identified at least to the family level. Ninety-four percent of the identified elements represented mammals, 3% reptiles, less than 1% amphibians, and 3% fish. Of the total 45-DO-243 assemblage, 221 elements (about 3%) were identified at least to the family level. Eighty one percent of the identified elements represent mammals, 3% reptiles, and the remaining 16% fish. Taxonomic composition and distribution of the vertebrate assemblages are summarized in Table 4-1.

There are 5,928 pieces of shell weighing 22,302 gm in the 45-DO-242 assemblage and 1,322 pieces weighing 4,639 gm in the 45-DO-243 assemblage. Although the shell from these sites has not been identified, shell identified in the testing phase of the project showed that the majority of the shell in project area sites is predominantly Margaritifera falcata with a minor component of Gonidea angulata.

The following summary presents criteria used to identify taxa where applicable, and remarks concerning distribution and cultural significance of the taxa included in this assemblage. A summary of elements representing each taxon is provided in Appendix C.

SPECIES LIST

MAMMALS (45-DO-242 - NISP=1596, 45-DO-243 - NISP=178)

Sylvilagus cf. nuttallii (Nuttall's cottontail) 45-DO-242 -- 3 elements.

There are three species of Sylvilagus known in eastern Washington: S. nuttallii, S. idahoensis, and S. floridanus. S. floridanus was introduced

Table 4-1. Taxonomic composition and distribution of vertebrate remains, 45-DO-242 and 45-DO-243.

Taxa	Zone								Site Total	
	11		12		13		14			
	NISP	MNI	NISP	MNI	NISP	MNI	NISP	MNI	NISP[1]	MNI[2]
45-DO-242										
MAMMALIA (NISP=1596)										
Leporidae										
Sylvilagus cf., _nuttallii_	3	1	-	-	-	-	-	-	3	1
Sciuridae										
Marmota flaviventris	-	-	3	1	21	2	1	1	25	2
Geomyidae										
Thomomys talpoides	3	1	-	-	32	8	11	2	46	8
Heteromyidae										
Perognathus parvus	4	1	2	1	1	1	-	-	7	2
Castoridae										
Castor canadensis	-	-	1	1	3	1	-	-	4	1
Cricetidae	-	-	-	-	2	-	-	-	2	-
Peromyscus maniculatus	-	-	-	-	1	1	-	-	1	1
Lagurus curtatus	3	2	-	-	-	-	-	-	3	2
Canidae										
Canis spp.	-	-	-	-	14	-	-	-	14	-
Canis cf. _familiaris_	-	-	3	1	8	1	-	-	11	2
Mustelidae										
Mustela frenata	1	1	-	-	-	-	-	-	1	1
Cervidae	-	-	-	-	7	-	-	-	7	-
Odocoileus spp.	9	1	15	1	341	12	4	1	368	12
Cervus elaphus	-	-	-	-	4	1	-	-	4	1
Antilocapradae										
Antilocapra americana	-	-	1	1	2	1	-	-	3	1
Bovidae										
Ovis canadensis	3	1	2	1	190	4	2	1	197	4
Deer-Sized	7	-	47	-	829	-	10	-	893	-
Elk-Sized	-	-	-	-	7	-	-	-	7	-
REPTILIA (NISP=54)										
Chelydridae										
Chrysemys picta	1	1	-	-	53	1	-	-	54	1
AMPHIBIA (NISP=2)										
Ranidae/Bufonidae	-	-	-	-	-	-	2	1	2	1
PISCES (NISP=54)										
Salmonidae	4	-	-	-	42	-	8	-	54	-
TOTAL	38		74		1,557		38		1,707	

Table 4-1. Cont'd.

Taxa	Zone 21 NISP	Zone 21 MNI	Zone 22 NISP	Zone 22 MNI	Zone 23 NISP	Zone 23 MNI	Zone 24 NISP	Zone 24 MNI	Site Total NISP	Site Total MNI
45-DO-243										
MAMMALIA (NISP=178)										
Sciuridae										
Marmota flaviventris	1	1	2	1	6	1	10	1	19	1
Geomyidae										
Thomomys talpoides	-	-	12	3	43	6	36	5	91	13
Heteromyidae										
Perognathus parvus	-	-	-	-	-	-	2	1	2	1
Cricetidae	-	-	1	-	1	-	-	-	2	-
Peromyscus maniculatus	-	-	1	1	1	1	-	-	2	1
Canidae										
Canis spp.	1	1	-	-	-	-	2	1	3	1
Cervidae										
Odocoileus spp.	8	1	11	1	13	1	2	1	34	1
Antilocapradae										
Antilocapra americana	-	-	1	1	-	-	1	1	2	1
Bovidae										
Ovis canadensis	-	-	4	1	-	-	-	-	4	1
Deer-Sized	-	-	7	-	8	-	2	-	17	-
REPTILIA (NISP=7)										
Chelydridae										
Chrysemys picta	2	1	-	-	5	1	-	-	7	1
PISCES (NISP=36)										
Salmonidae	2	-	9	-	21	-	4	-	36	-
TOTAL	14		48		98		59		219	

[1] NISP = Number of Identified Specimens.
[2] MNI = Minimum Number of Individuals.

in historic times (Dalquest 1941). The other two species are indigenous to eastern Washington. S. idahoensis is currently restricted in range to the central Plateau and is poorly represented prehistorically. S. nuttallii is larger, more widely distributed and better represented in the eastern Washington archaeological record. The specimens in the 45-DO-242 assemblage were tentatively assigned to the species S. nuttallii on the basis of size. Cottontail rabbits and hares were exploited by ethnographically known people for their fur and as a food resource (Post 1938; Ray 1932).

Marmota flaviventris (yellow-bellied marmot) 45-DO-242 -- 25 elements, 45-DO-243 -- 19 elements.

Marmots are common residents of talus slopes in the site area. They were exploited ethnographically as a small game resource (Ray 1932; Post 1938).

Thomomys talpoides (northern pocket gopher) 45-DO-242 -- 45 elements, 45-DO-243 -- 94 elements.

Pocket gophers are common in the project area. They spend most of their lives underground and burrow extensively. There is very little evidence that gophers have ever been exploited. They undoubtedly occur in this assemblage as a result of natural processes.

Perognathus parvus (Great Basin pocket mouse) 45-DO-242 -- 7 elements, 45-DO-243 -- 24 elements.

Pocket mice are common residents in the sagebrush areas of eastern Washington. P. parvus burrows extensively. Like gophers, P. parvus is most likely present as a result of natural processes.

Castor canadensis (beaver) 45-DO-242 -- 4 elements.

There is ethnographic evidence that beaver were exploited (Post, in Spier 1938), presumably for their pelts and as a food resource, though neither use is explicitly stated. Beaver teeth have been used for incising wood, bone, antler and soft stone by the Coeur d'Alene (Teite 1930).

Peromyscus maniculatus (deer mouse) 45-DO-242 -- 1 element, 45-DO-243 -- 1 element.

Deer mice are residents of all habitat types in the project area, and are most likely present as a result of natural processes.

Lagurus curtatus (sagebrush vole) 45-DO-242 -- 3 elements.

Sagebrush voles inhabit dry sagebrush areas with little grass (Maser and Storm 1970:142). Only cranial material of this species is distinguishable from Microtus sp. The occlusal surface of M^3 (Maser and Storm 1970) and the location of the mandibular foramen (Grayson 1982) are distinctive. L. curtatus also is most likely a naturally occurring taxon.

Canis sp (wolves, coyotes and dogs) 45-DO-242 -- 14 elements, 45-DO-243 -- 3 elements.

Canis cf. familiaris (domestic dog) 45-DO-242 -- 11 elements.

Both Canis latrans (coyote) and C. familiaris (domestic dog) are common in the project area today. C. latrans is an indigenous species, and C. familiaris has great antiquity in the Northwest (Lawrence 1968). C. lupus (wolf) is known to have been a resident of the region in the past, but is now locally extinct.

The canids are extremely difficult to distinguish osteologically. The only elements from these assemblages that could be assigned to species were the mandible with teeth from 45-DO-242. These were assigned to C. cf. familiaris on the basis of morphological features of the lower molars and foreshortening of the horizontal ramus resulting in molar crowding.

Dogs were used ethnographically for hunting deer, but were not eaten except in emergencies (Post 1938). Coyotes, however, were considered good food (Ray 1932:90).

Mustela frenata (long-tailed weasel) 45-DO-242 -- 1 element.

Weasels are ubiquitous in Washington, and are very active predators known to follow prey species such as gophers into their burrows. Weasels are not considered to be of economic value at present, and there is no ethnographic record that they were exploited.

Cervus elaphus (elk) 45-DO-242 -- 4 elements.

Elk are not a member of the extant local fauna of the project area. The closest living population is in the Cascade Mountains to the west (Ingles 1965). Elk bones occur in low frequencies in many archaeological sites in eastern Washington, however, indicating that elk once occupied a more extensive range than at present and/or that people were traveling some distance to hunt them.

Odocoileus spp. (deer) 45-DO-242 -- 379 elements, 45-DO-243 -- 34 elements.

Two species of deer may be represented in these assemblages, Odoeoileus heminous and Odoeoileus virginianus. Deer are thought to have represented a major food resource for the prehistoric inhabitants of eastern Washington (Gustafson 1972) as they did for the ethnographically known cultures (Post 1938; Ray 1932).

Antilocapra americana (pronghorn antelope) 45-DO-242 -- 3 elements, 45-DO-243 -- 2 elements.

Although antelope are present today in Washington only as an introduced species (Ingles 1965), antelope remains are common in both historic and prehistoric archaeological sites, especially in the arid part of the Columbia Basin (Gustafson 1972; Osborne 1953). There are ethnographic records of hunting practices associated with antelope procurement (Ray 1932; Post 1938).

Ovis canadensis (mountain sheep) 45-DO-242 -- 197 elements, 45-DO-243 -- 4 elements.

Mountain sheep occur in archaeological sites in eastern Washington with some regularity. The presence of this species is somewhat difficult to interpret, however, because references to it in the ethnographic literature are so scarce. Moreover, when competition with man and domestic stock for range became severe during historic times, the habitat preference of this species appears to have changed. (Manville, in Monson and Sumner 1980). Mountain sheep are known ethnographically to have been exploited both for meat and as a source of bone for tools (Spinden 1908).

Caution should be exercised in interpreting the quantity of sheep elements represented in Zone 13 of 45-DO-242. This figure is extremely inflated by the presence of numerous (129) fragments of what appears to be a single horn core.

REPTILES (45-DO-242 - NISP=54, 45-DO-243 - NISP=7)

Chrysemys picta (Painted turtle) 45-DO-242 -- 54 elements, 45-DO-243 -- 7 elements.

Painted turtle is the only turtle currently living in the project area. Clemmys marmorata (western pond turtle) has been reported in the eastern part of Washington in the ethnographic literature (Ray 1932:87), but this would represent a major extension of the known range of C. marmorata. At the present time, C. marmorata only occur on the west side of the Cascades and in the southern part of the state. Because there is no way of verifying that any other turtle has ever lived in the project area, and no

indication that they were imported, all turtle remains have been assigned to C. picta.

AMPHIBIANS (45-DO-242 - NISP=2)

Ranidae/Bufonidae (frogs and toads) 45-DO-242 -- 2 elements.

Both frogs and toads inhabit the project area (Stebbins 1966). Inadequate comparative material precluded assigning these elements to the correct family.

PISCES (45-DO-242 - NISP=54, 45-DO-243 - NISP=36)

Salmonidae (salmon, trout, and whitefish) 45-DO-242 -- 54 elements, 45-DO-243 -- 36 elements.

These vertebrae could belong to any of at least eight species of salmonid fish known in the project area. All fish vertebrae with parallel-sided fenestrated centra were assigned to this family.

THE 45-DO-242 ASSEMBLAGE

Fragments of small artiodactyls (deer, mountain sheep, antelope) remains make up approximately 91% of the identifiable mammalian remains from 45-DO-242. The small artiodactyl elements that could be assigned to genus and species are overwhelmingly deer. A number of mountain sheep elements were recovered, especially in Zone 13, and antelope are at least nominally represented in Zones 12 and 13. The large number of mountain sheep elements in Zone 13 is misleading--they apparently represent the highly fragmented remains of a single horn core (see Appendix B, Table B-1).

The distribution of butchering marks and burned elements in this assemblage is shown in Table 4-2. Ninety-five elements exhibit butchering marks and 60 elements appear burned. Of these, 99% of the butchering marks appear on small artiodactyl elements and 93% of the burned elements are small artiodactyl. Relative abundance and analysis of butchering both indicate that small artiodactyls are the primary subsistence remains represented in this assemblage.

Despite the low frequency of elk remains, one of the elements exhibits evidence of butchering. Two antler fragments are burned and appear to have been used as artifacts (see Chapter 3). Marmots, turtles, and salmonid fish were evidently exploited either for food or as a source of materials for artifacts (Table 4-2).

The distribution of butchering marks and burned bone by zone are given by element in Tables 4-3 and 4-4 respectively. It appears that the entire carcass of the artiodactyls was used at the site, as elements from all portions of the skeleton are at least occasionally burned or show evidence of butchering.

Table 4-2. Distribution of butchering marks and burned bone by taxon, 45-DO-242 and 45-DO-243.

Taxon	45-DO-242														45-DO-243													
	Zone										Site Total				Zone										Site Total			
	11		12		13				14						11		12		13				14					
	2	B	2	B	1	2	3	B	2	B	1	2	3	B	2	B	2	B	1	2	3	B	2	B	1	2	3	B
Marmota flaviventris	-	-	-	1	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cervus elaphus	-	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Odocoileus spp.	-	-	-	-	3	3	-	2	-	-	3	3	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ovis canadensis	-	-	-	-	4	1	1	2	-	-	4	1	1	2	-	-	-	-	-	-	-	-	-	-				
Deer-Sized	1	-	4	2	1	75	-	50	1	-	1	81	-	52	-	-	3	-	-	1	-	-	1	-	-	5	-	-
Chrysemys picta	-	-	-	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Salmonid	-	-	-	-	-	-	-	2	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL	1		4	2	8	80	1	57	1		8	86	1	60			3			1			1			5		

* Key:
1 = striae
2 = flake scar
3 = chopping scar
B = burned

Table 4-3. Distribution of butchering marks by element and zone, 45-DO-242 and 45-DO-243.

Element	45-DO-242						45-DO-243		
	Zone						Zone		
	11	12	13			14	22	23	24
	Flake scar	Flake scar	Striae	Flake scar	Chopping scar	Flake scar	Flake scar	Flake scar	Flake scar
Horn core	-	-	2	-	1	-	-	-	-
Skull	-	-	1	-	-	-	-	-	-
Mandible	-	-	1	1	-	-	-	-	-
Atlas	-	-	1	-	-	-	-	-	-
Humerus shaft	-	-	1	14	-	-	-	-	-
Radius shaft	-	-	-	9	-	-	-	1	-
Metacarpal prox	-	-	1	-	-	-	-	-	-
Metacarpal shaft	-	-	-	8	-	-	-	-	-
Femur shaft	1	2	-	17	-	-	-	-	-
Tibia shaft	-	1	-	15	-	1	3	1	1
Metatarsal prox	-	-	-	1	-	-	-	-	-
Metatarsal shaft	-	-	-	15	-	-	-	-	-
First phalange	-	-	1	-	-	-	-	-	-
Metapodial shaft	-	1	-	10	-	-	-	-	-

Table 4-4. Distribution of burned elements by taxon and zone, 45-DO-242.

Element	Zone 12		Zone 13					
	Deer-sized	*Marmota flaviventris*	*Ovis canadensis*	*Odocoileus* sp.	Cervid	Deer-sized	*Chrysemys picta*	Salmonid
Teeth	-	-	1	2	-	-	-	-
Antler	-	-	-	-	2	-	-	-
Skull	-	-	-	-	-	3	-	-
Mandible	-	-	-	-	-	3	-	-
Atlas	-	-	-	-	-	3	-	-
Cervical	-	-	-	-	-	5	-	-
Thoracic	-	-	-	-	-	1	-	-
Lumbar	1	-	-	-	-	2	-	-
Vertebra	-	-	-	-	-	-	-	2
Rib	-	-	-	-	-	14	-	-
Scapula	-	-	-	-	-	3	-	-
Humerus shaft	-	-	-	-	-	2	-	-
Ulna prox	-	1	-	-	-	-	-	-
Ulna shaft	-	-	-	-	-	1	-	-
Carpals	-	-	-	-	-	1	-	-
Innominate	-	-	-	-	-	1	-	-
Tibia shaft	-	-	-	-	-	6	-	-
Astragalus	-	-	-	-	-	1	-	-
Metatarsal shaft	1	-	-	-	-	3	-	-
Metapodial shaft	-	-	1	-	-	1	-	-
Shell	-	-	-	-	-	-	1	-

SEASONALITY

Three taxa in this assemblage may indicate season of site occupation: Odocoileus sp., Marmota flaviventris, and Chrysemys picta. The ages at death for sixteen fragmentary deer mandibles with teeth from Zone 13 have been determined by reference to criteria described by Robinette et al. (1957) and Severinghaus (1949). Because deer generally give birth in May or June (Ingles 1965), it is reasonable to assume that these deer were killed during the seasons indicated in Table 4-5.

Marmots and turtles are seasonally active taxa. Marmots enter estivation in June, and go into hibernation in August or September. They emerge in March (Ingles 1965, Dalquest 1948). Turtles hibernate from late October until March or April (Stebbins 1966, Ernst and Barbour 1972). The estimated seasons of death for each of these taxa are also indicated in Table 4-5. The faunal evidence indicates that in Zone 13 the site was occupied during all seasons except December through February. There is too small a sample from the remaining three zones for any inference regarding seasonality.

THE 45-DO-243 ASSEMBLAGE

Thomomys talpoides remains dominate the identified assemblage from 45-DO-243, making up approximately 53% of the mammalian sample. Pocket gophers are common natural inhabitants of eastern Washington archaeological sites and were most likely included in this assemblage by noncultural processes. Other common residents of the area that may be intrusive in this assemblage or may have been accumulated by natural processes include Perognathus parvus and the Peromyscus maniculatus. Thus approximately 56% of the identifiable remains from this site may be attributed to noncultural accumulation processes.

The remaining 79 mammal bones are an extremely small sample from which to draw cultural inferences. It is noteworthy, however, that this small sample reflects rather closely the pattern of the larger sample from 45-DO-242. The assemblage is dominated by deer and deer-sized elements, with only a couple artiodactyl elements assignable to antelope or mountain sheep. Marmots occur fairly regularly especially in the older zones.

Turtles also occur in this assemblage, but in very low frequencies. Fish remains constitute a more significant component of the 45-DO-243 assemblage than they do of the 45-DO-242 assemblage.

Because only five elements exhibit butchering marks and none of the identified elements were burned, little can be said regarding butchering. The few seasonal indicators available for this site show a somewhat different pattern than the indicators did for 45-DO-242. The two ageable deer, one from Zone 22 and one from Zone 23, appear to have died sometime during December through February, those months for which there is no seasonal evidence in the 45-DO-242 assemblage. Marmots and turtles suggest at least a spring occupation of all zones. Thus we have evidence that Zones 22 and 23 were occupied at least during winter and spring.

Table 4-5. Distribution of seasonal indicators, 45-DO-242 and 45-DO-243.

Zone	Taxon Element	Age	Season of Death (Jan Feb Mar Apr May Jun Jul Aug Sept Oct Nov Dec)
45-DO-242			
11	*Chrysemys picta*		NISP=1
12	*Marmota flaviventris*		NISP=3
13	*Chrysemys picta*		NISP=53
	Marmota flaviventris		NISP=21
	Odocoileus spp.	10 mo	
		10 mo	
		10 mo	
		22 mo	
		60 mo	
		60 mo	
		192 mo	
		26 mo	
		26 mo	
		16 mo	
		40 mo	
		64 mo	
		30 mo	
		42 mo	
		126 mo	
14	*Marmota flaviventris*		NISP=1
45-DO-243			
21	*Chrysemys picta*		NISP=1
	Marmota flaviventris		NISP=2
22	*Marmota flaviventris*		NISP=2
	Odocoileus spp.	8 mo	
23	*Chrysemys picta*		NISP=5
	Marmota flaviventris		NISP=6
	Odocoileus spp.	9 mo	
24	*Marmota flaviventris*		NISP=10

DISCUSSION

All taxa from both sites are native to the project area, and, with the exception of those species recently extirpated, all may be found in the project area today. As a whole, both assemblages represent the fauna that would be expected in a cultural site in the project area. Much of the difference between the two assemblages may be a result of the small size of the sample from 45-DO-243.

Most of the faunal remains in both of these sites--especially the artiodactyls, marmots, turtles, and fish--were most likely deposited as a result of subsistence-related activities. Although it has recently been argued that small mammals, such as mice and gophers, may have provided a food resource for prehistoric people (Stahl 1982), no evidence in either assemblage supports such a conclusion.

The only possible domesticated species in either assemblage is *Canis familiaris* in Zones 12 and 13 of 45-DO-242. Domestic dogs are known from as early as 8400 B.C. in the Northwest (Lawrence 1968), and are reported in the ethnographic literature (Post 1938, Ray 1932). Although there is ethnographic evidence that coyote and wolf were trapped for their pelts, there is no indication that coyotes, wolves, or dogs were regularly eaten. The ethnographies reveal that dogs were used in the hunting of deer and were only eaten in times of famine. Occasionally, they were sold to French traders as food (Post 1938).

5. FEATURES ANALYSIS

Analysis of finer temporal units and spatial distributions of artifacts and features within the zone is an important adjunct to the broad comparisons of zonal content made in the preceding chapters. The analytic zones necessarily span relatively long periods because finer temporal distinctions cannot be reliably correlated across the site. The zones combine the material products of numerous short-term activities, thus obscuring much small scale temporal and spatial variability in cultural activities. The detailed descriptions of individual features in this chapter supplement the zonal descriptions.

During excavation, 48 features were recorded at 45-DO-242 and 27 at 45-DO-243. Some of these field-recorded features represent natural strata and are not considered in feature analysis. Others were found to be redundant and combined, or inconsequential and disregarded. The cultural features which remained were classified according to a two-tiered paradigmatic classification (described in Campbell 1984d) which considers, on the one level, feature boundaries, provenience, shape and patterning; and, on the second level, the abundance of material contents. By combining the information of the paradigmatic classes with information on size and actual material counts, we have classified the features into functional types. These functional types are broadly defined as housepits, firepits, other pits, exterior occupation surfaces, and debris scatters. These, in turn, may be further subdivided: interior and exterior firepits and pits are differentiated, and bone, shell, and FMR concentrations are considered as separate functional types. Our feature typology provides the organization for this description of features at 45-DO-242 and 45-DO-243 as well as for future comparisons of all cultural features recorded by the Project.

Table 5-1 lists the 29 cultural features at 45-DO-242 and 7 cultural features at 45-DO-243 and reconciles them with the feature numbers assigned in the field. The table shows that, although they are adjacent, the two sites are very different in their internal components. Three housepits, eight other pits, seven firepits, and several concentrations of bone, rock, or shell are recorded for the site. 45-DO-243 yielded much less--only one possible housepit, a smaller pit, a firepit, and four shell concetrations. Basic descriptive information for the features at these two sites is recorded in Table 5-2 (dimensions and provenience) and Table 5-3 (material contents and estimated excavated volume); more detailed data, such as functional tool types (Table 5-4), identified bone (Table 5-5), and a breakdown of lithic debitage by material type (Table 5-6) is given in tabular form for 45-DO-242 only. For 45-DO-243, these few items are described in the text. Type assignments are

Table 5-1. Features by zone, showing correspondence between field assigned numbers and final numbers, 45-DO-242 and 45-DO-243.

Zone	Feature Name	Feature Number(s)
45-DO-242		
11		
	Pits 7 and 8	No feature numbers
	Shell Concentration A	Features 3, 17
	Firepit 7	Feature 30
	Shell Concentration B	Feature 28
	Lithic Concentration A	Feature 19
12		
	Firepit 4	Features 2, 5
	Firepit 5	Feature 16
	Firepit 6	Feature 31
	Bone Concentration D	Feature 21
	Bone Concentration E	Feature 46
	FMR Concentration B	Feature 6
	Rock Concentration C	Feature 47
13: Late		
	Pit 3	Features 9
	Firepit 3	No feature number
	Pit 4	Features 32, 34, 36
	Pit 5	Parts of Feature 14
	Bone Concentration C	Feature 24
	FMR Concentration A	Feature 26
	Pit 6	Feature 7
13: Early		
	Pit 1	Feature 27
	Bone Concentration A	Feature 10
	Housepit 1	Feature 8
	Firepit 1	Feature 29
	Housepit 2	Features 11, 23, 42 (floor); 37 (fill)
	Firepit 2	Feature 43
	Housepit 3	Feature 38, parts of Features 14, 18
	Pit 2	Feature 25
	Bone Concentration B	Features 20, 35
45-DO-243		
22		
	Pit 2	Feature 18
	Firepit 1	Feature 10 plus associated levels
	Shell Concentration D	Feature 6
23		
	Pit 1	Feature 8
	Shell Concentration B	Feature 24
	Shell Concentration C	Feature 16
24		
	Shell Concentration A	Feature 12

Table 5-2. Dimensions and provenience of cultural features by feature type, 45-DO-242 and 45-DO-243.

Zone	Feature	Dimensions	Provenience
45-DO-242			
13	Housepit 1	6-7 m; 180 cm deep*	0N-4N, 6W-2W; levels various
13	Housepit 2	8 m diameter; 100 cm deep*	3S-5N, 30W-22W; levels various
13	Housepit 3	6 m diameter; 50 cm deep*	1S12W; levels 100-120 (Features 14, 18) 2S12W; levels 110-140 (Feature 14) 4S16W; levels 110-150 (Feature 38)
13	Firepit 1	35 cm diameter; 14 cm deep*	1N3W; levels 100-110
13	Firepit 2	100x130x20 cm	2N27W, levels 180-190
13	Firepit 3	65 cm diameter; 13 cm deep*	2N6-4W; levels not recorded
12	Firepit 4	200x150x35 cm*	6N4E, levels +40-+0
12	Firepit 5	100x40x10 cm*	1S8E, level 20
12	Firepit 6	70x60x30 cm*	4N5W, levels 80-110
11	Firepit 7	75x45x25 cm	2N28W, levels 30-40
13	Pit 1	85x85x50 cm*	4N17W, levels 170-220
13	Pit 2	120x90x30 cm*	2N2-3E, levels 180-190
13	Pit 3	250x200x70 cm*	2N-4N, 6W-4W; levels various
13	Pit 4	6x4x.40 m*	2N28W, levels 70-100
13	Pit 5	200x75x20 cm*	0S12W, levels 50-100 (Feature 14) 2S12W, levels 90-100 (Feature 14)
13	Pit 6	72x87x25 cm*	6N4E, levels 50-70
11	Pit 7	25 cm across; 20 cm deep*	0N2-4E; levels not recorded
11	Pit 8	10 cm across; 20 cm deep*	0N2-4E; levels not recorded
13	Bone concentration A	130x100x20 cm*	4N25W, levels 140-150
13	Bone concentration B	375x375x25 cm*	5-6N32W, levels 70-110 (Feature 20) 4N33-34W, levels 60-100 (Feature 35)
13	Bone concentration C	100x100x20 cm*	2N2E, levels 50-60
12	Bone concentration D	200z200x20 cm*	4N18W, levels 50-80
12	Bone concentration E	100x100x20 cm*	1N22W, levels 50-60
13	FMR concentration A	45 cm diameter; 20 cm high*	6N31W, levels 50-60
12	FMR concentration B	100x100x20*	4N26W, levels 60-70
12	FMR concentration C	50 cm diameter; 20 cm high	2N22W, levels 80-90
11	Lithic concentration A	100x50x20 cm*	5N32W, levels 30-40
11	Shell concentration A	6x4x.15 m*	0N-4N, 28W-26W; levels various
11	Shell concentration B	1.5 m diameter; 20 cm deep	2N-4N8W; levels 20-30
45-DO-243			
23	Pit 1	30x30x30 cm*	5N0E, levels 40-60
22	Pit 2	125x100x70 cm*	7-8N18W, levels 70-100
22	Firepit 1	120 cm across; 25 cm deep*	14N12E, levels 80-90 (Feature 10)
24	Shell concentration A	100x100x20 cm*	3S12E, levels 170-180
23	Shell concentration B	100x100x20 cm*	8N18W, levels 120-130
23	Shell concentration C	50x50x5 cm*	2N12W, level 70
22	Shell concentration D	100x100x20 cm*	5-6N12W, levels 110-120

* partially exposed

Table 5-3. Material contents and estimated excavation volume of features at 45-DO-242 and 45-DO-243.

Zone	Feature	Debitage	Lithic artifacts	Bone artifacts	Unmodified bone #/wt(g)	Shell #/wt(g)	Fire modified rock #/wt(g)	Volume excavated (m^3)
45-DO-242								
11								
	Firepit 7	9	3	1	66/52	31/231	30/12,060	.317
	Pit 7	None recorded						
	Pit 8	None recorded						
	Lithic concentration A	222	35	-	-/-	-/-	-/-	.150
	Shell concentration A	31	7	-	78/26	782/231	81/16,970	.575
	Shell concentration B	38	4	2	98/20	200/1,281	18/2,250	.167
12								
	Firepit 4	27	8	-	19/39	68/405	314/98,385	.767
	Firepit 5	8	1	1	4/6	9/82	-/-	.050
	Firepit 6	95	3	-	265/98	6/34	2/100,000	.250
	Bone concentration D	28	8	1	1,017/400	5/26	34/7,480	.750
	Bone concentration E	74	1	-	182/20	-/-	-/-	.300
	FMR concentration B	-	-	-	-/-	-/-	46/31,660	.100
	FMR concentration C	-	-	-	-/-	-/-	10/17,080	.050
13								
	Housepit 1 (floor and fill)	1,296	56	7	10,128/3,599	216/446	141/29,078	9.283
	Housepit 2	159	34	3	3,193/802	3/4	229/63,540	4.689
	fill	443	29	4	2,766/525	47/95	161/45,230	3.103
	Housepit 3 (floor approximate)	15	3	-	196/94	-/3	11/9,104	.600
	Firepit 1	-	-	-	-/-	-/-	11/?	.067
	Firepit 2 (interior)	5	1	8	427/86	-/-	53/9,160	.158
	Firepit 3	None recorded						
	Pit 1	30	2	1	56/15	2/1	1/360	.317
	Pit 2	-	-	-	174/80	-/-	-/-	.15
	Pit 3	706	34	10	12,167/4,128	2,368/4,518	199/32,901	1.942
	Pit 4	98	10	-	598/119	3/10	5/145	1.718
	Pit 5	-	1	-	83/13	-/1	55/17,838	.42
	Pit 6	13	2	-	581/513	-/-	87/16,820	.100
	Bone concentration A	23	-	-	538/258	7/8	16/5,310	.350
	Bone concentration B	71	14	-	8,607/4,175	11/20	14/1,428	.925
	Bone concentration C	37	4	1	588/255	-/-	-/-	.500
	FMR concentration A	-	-	-	-/-	-/-	14/12,970	.100
45-DO-243								
22								
	Pit 2	4	-	-	167/189	1/2	4/300	.20
	Firepit 1	9	-	-	23/-	-/-	-/-	.20
	Shell concentration D	6	-	-	19/30	89/437	-/-	.15
23								
	Pit 1	84	3	-	125/35	10/25	1/60	.25
	Shell concentration B	4	3	-	52/34	832/3,010	1/5,000	.10
	Shell concentration C	1	-	-	4/7	21/42	0/0	.05
24								
	Shell concentration A	-	-	-	9/13	19/103	-/-	.10

Table 5-4. Identified bone from features, 45-DO-242.

Feature	Deer	Deer-size	Elk	Elk-size	Elk-Bison	Antelope	Mountain Sheep	Sheep-Antelope	Cervidae, unknown	Salmonidae, unknown	Salmon	Beaver	Weasel	Dog	Turtle	Marmot	Mouse	Pocket Gopher
Zone 11																		
Firepit 7	1	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-
Shell Concentration A	1	-	-	-	-	-	1	-	-	-	1	-	1	-	-	-	-	-
Shell Concentration B	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
Zone 12																		
Firepit 4	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Firepit 5	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Firepit 6	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-
Bone Concentration D	1	13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zone 13																		
Housepit 1	63	103	1	1	-	-	-	3	-	-	-	-	-	-	1	4	2	11
Housepit 2																		
Floor	12	31	-	-	-	-	-	-	-	15	-	2	-	-	-	10	-	1
Firepit 2	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fill	13	25	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-
Housepit 3	2	7	-	-	-	-	4	-	-	-	24	-	-	-	-	-	-	-
Pit 1	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pit 3	73	188	1	-	-	-	136	1	2	-	-	-	-	19	48	1	-	7
Pit 4	1	1	-	-			-	-	-	-	-	-	-	-	-	1	-	-
Pit 6	19	40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bone Concentration A	1	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bone Concentration B	128	332	-	1	3	-	19	-	-	-	-	-	-	-	-	-	-	1
Bone Concentration C	4	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 5-5. Formed objects from features, 45-DO-242.

Feature	Lithic																				Bone/Antler			
	Utilized Flake	Unifacially Retouched Flake	Bifacially Retouched Flake	Resharpening Flake	Biface	Projectile Point	Projectile Point Base	Projectile Point Tip	Linear Flake	Drill	Graver	Scraper	Core	Tabular Knife	Hammerstone	Chopper	Millingstone	Hopper Mortar Base	Bead	Indeterminate	Awl	Billet	Flaked Long Bone	Indeterminate
Zone 11																								
Firepit 7	1	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Shell Concentration A	-	-	-	-	4	1	-	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
Shell Concentration B	-	1	1	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Lithic Concentration A	10	3	3	-	6	1	6	3	1	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-
Zone 12																								
Firepit 4	4	-	-	1	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-
Firepit 5	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
Firepit 6	-	-	-	-	1	-	-	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	-
Bone Concentration D	-	2	1	-	-	1	-	1	-	1	-	-	-	1	-	1	-	-	-	-	-	-	-	1
Bone Concentration E	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
Zone 13																								
Housepit 1	19	4	3	1	9	4	3	5	1	2	2	1	8	-	1	-	1	-	1	1	-	-	1	5
Housepit 2																								
Floor	6	2	-	-	4	7	2	1	1	-	-	4	-	5	-	2	-	-	2	-	-	-	-	2
Firepit 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	8	-	-	-	-	8
Fill	4	3	1	-	4	2	1	1	1	1	-	8	-	3	1	1	-	-	3	-	-	-	-	3
Housepit 3	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Pit 1	-	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1
Pit 3	10	8	2	-	9	3	3	2	4	-	-	3	1	1	-	-	-	-	6	2	-	1	2	6
Pit 4	4	1	-	-	-	1	-	1	-	-	-	1	-	1	1	-	-	-	-	-	-	-	-	-
Pit 5	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pit 8	-	-	-	-	-	1	-	-	1	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-
Bone Concentration A	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	1
Bone Concentration B	5	-	-	1	2	-	1	-	-	1	-	-	-	3	-	-	-	-	-	-	-	-	-	-
Bone Concentration C	2	-	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1	-	-	-

Table 5-6. Material type of >1/4-in debitage from features, 45-DO-242.

Feature	Jasper	Chalcedony	Coarse-grained Quartzite	Fine-grained Quartzite	Basalt	Fine-grained Basalt	Siliceous Mudstone	Schist	Opal	Petrified Wood	Obsidian	Argillite	Granite	Sandstone	Total
Zone 11															
Firepit 7	3	3	1	-	-	1	-	-	1	-	-	-	-	-	9
Shell Concentration A	20	5	3	-	1	-	2	-	-	-	-	-	-	-	31
Shell Concentration B	15	21	1	-	-	-	-	-	1	-	-	-	-	-	38
Lithic Concentration A	199	19	-	-	2	2	-	-	-	-	-	-	-	-	222
Zone 12															
Firepit 4	12	5	7	1	-	-	1	1	-	-	-	-	-	-	27
Firepit 5	2	4	-	-	-	-	-	-	-	-	-	-	-	-	6
Firepit 6	24	55	6	-	-	-	-	-	8	2	-	-	-	-	95
Bone Concentration D	15	3	8	2	-	-	-	-	-	-	-	-	-	-	28
Bone Concentration E	60	4	6	-	-	-	-	-	-	-	-	3	-	1	74
Zone 13															
Housepit 1	508	661	69	4	2	1	2	-	43	3	1	-	1	-	1,295
Housepit 2															
Floor	60	52	19	-	-	-	-	-	27	-	-	1	-	-	159
Firepit 2	1	-	2	-	-	-	-	-	2	-	-	-	-	-	5
Fill	66	83	51	3	-	-	3	-	74	1	-	-	3	-	443
Housepit 3	9	2	3	1	-	-	-	-	-	-	-	-	-	-	15
Pit 1	8	1	4	12	-	1	4	-	-	-	-	-	-	-	30
Pit 3	446	563	21	1	-	2	1	1	23	-	-	-	-	-	706
Pit 4	8	38	23	2	-	-	1	-	23	-	1	-	2	-	98
Pit 6	4	1	7	-	-	-	-	-	-	-	-	-	-	1	13
Bone Concentration A	21	1	-	-	1	-	-	-	-	-	-	-	-	-	23
Bone Concentration B	32	19	12	3	1	-	1	-	-	-	-	2	-	1	71
Bone Concentration C	24	10	-	2	-	-	1	-	-	-	-	-	-	-	37

not given here for projectile points from features; this information can be found in the stylistic section of the artifact chapter.

FEATURES AT 45-DO-242

The 29 features recorded at 45-DO-242 occur in the upper three analytic zones (Table 5-2). No cutural features were recorded in Zone 14.

ZONE 13

Zone 13 marks the most intensive use of 45-DO-242. Nine of the 11 pit features, including three housepits, and large artifact scatters, occur in Zone 13 (Figure 5-1). Stratigraphy and superposition indicate three main episodes of feature construction in Zone 13 at 45-DO-242.

The oldest feature at the site is Pit 1 originating at the bottom of Zone 13 deposits and excavated deeply into the natural strata of Zone 14. A portion of Pit 1, measuring 95 cm by 85 cm, was exposed in the northeast corner of 4N17W. Because further digging might have proved dangerous, excavations were terminated before any floor was reached, and the pit's depth is unknown. Fifty-six bone fragments, a bifacially retouched flake, and a projectile point were recovered from this pit.

Bone Concentration A is an irregularly shaped, carbon-stained area, primarily in 4N25W. Fire-modified rocks and over 500 bone fragments occur within a matrix of charcoal-stained and mottled soil (Figure 5-2). This postulated activity area originates near the bottom of DU II (Stratum 400 and 600) below the fill of Housepit 2. Its position within DU II suggests that this feature is roughly contemporaneous with Pit 1 which extends through the cobble layer into the basal yellow sand.

The next series of features in Zone 13, the three housepits and associated features, all originate in the middle of DU II.

Housepit 1 is a deep, excavated structure in units 4N6W, 2N6W, 3N4W, and 2N4W. Although slumping and later deposition has obscured its surface of origin (Figure 5-3), this housepit appears to originate in the middle of DU II. Because unstable soil conditions halted the investigations, only a small portion of the floor (about one square meter) was exposed. The material listed in the tables thus comes from over four cubic meters of fill. Housepit 1 is about 160 cm deep, with an estimated radius of 2-2.5 meters. Approximately one-third of the housepit was excavated, but its shape cannot be determined. The most striking feature in Housepit 1 is the bench cut into the cobble layer which forms the base of the housepit. This bench is small, but unmistakable. Profiles (Figure 5-3) suggest that the looser, upper deposits slumped over onto this bench after the pit house was abandoned. Benches are not common among housepits on the Columbia Plateau, and those that have been recorded (Nelson 1969; Southard 1973; Chance et al 1977) date to 1000-500 B.P. Nelson (1973:383), however, states that this type of housepit is typical of the earliest pit houses introduced into the Columbia Plateau: "This pit house type was excavated to as much as two meters below ground level and contained an unbroken internal bench, possibly for sleeping or storage." The bench in

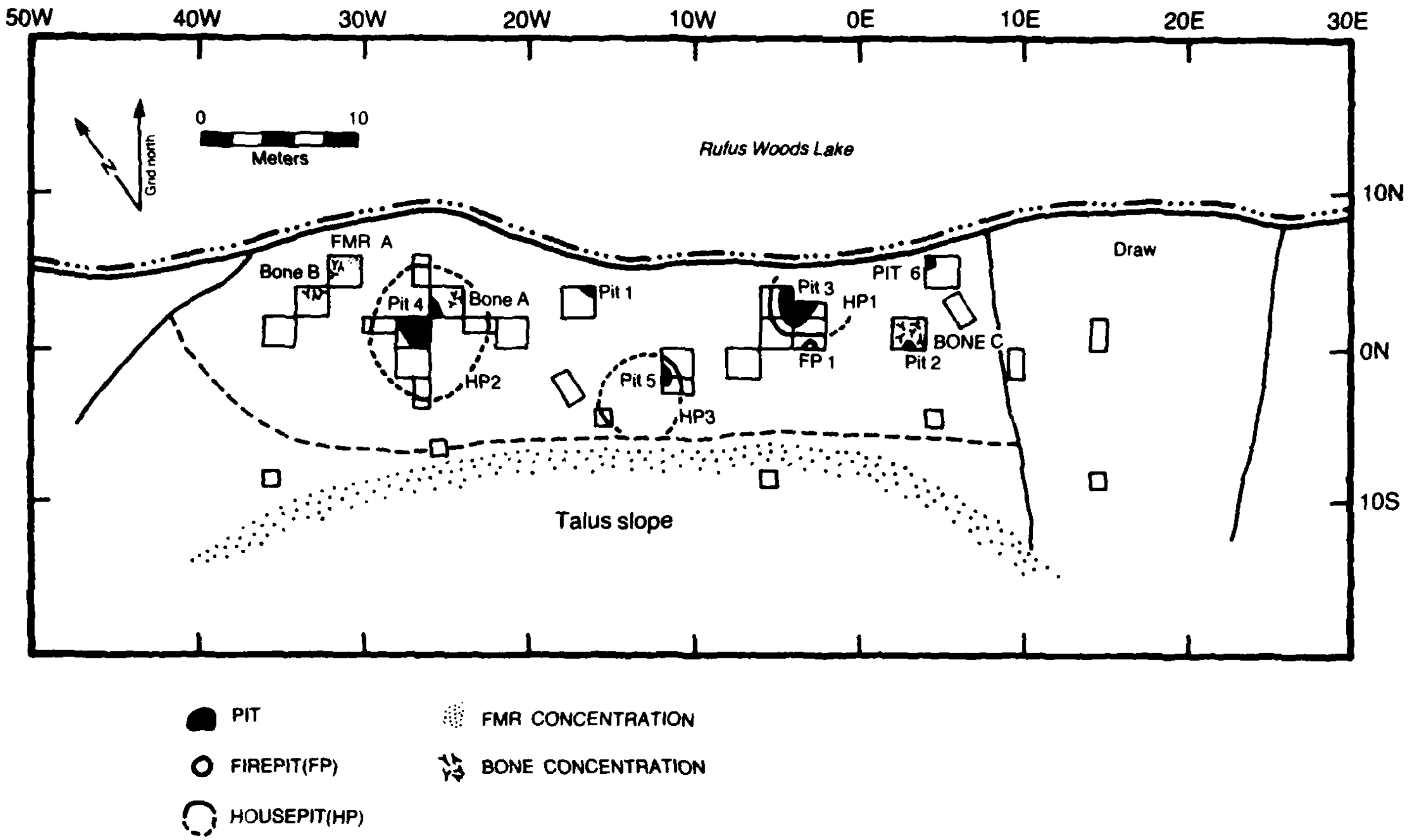


Figure 5-1. Plan map of cultural features, Zone 13, 45-DO-242.

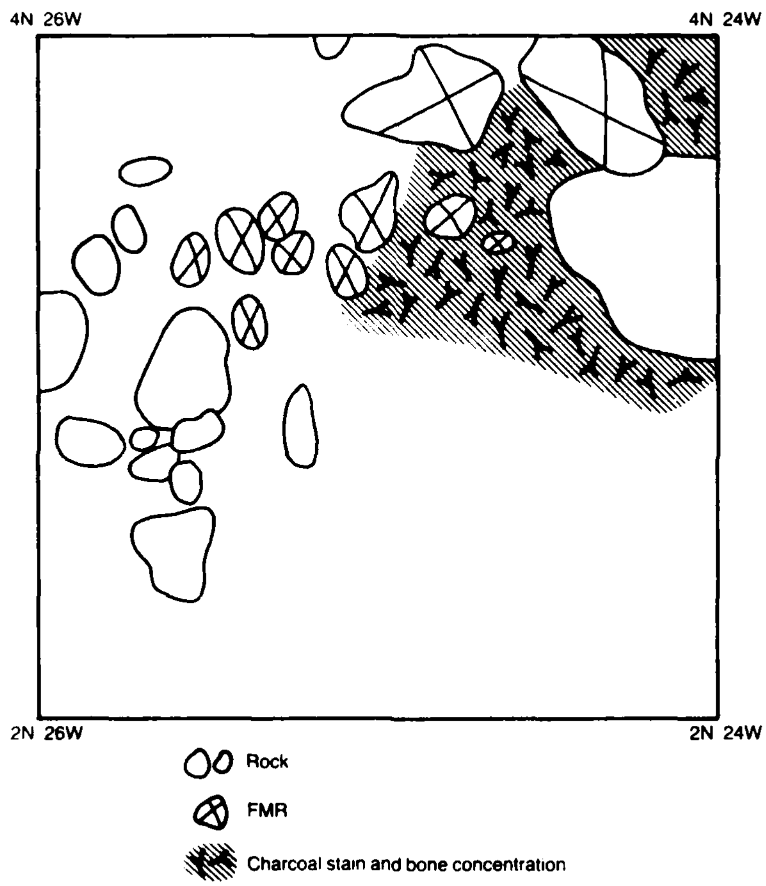


Figure 5-2. Plan map of Bone Concentration A, Zone 13, 45-DO-242.

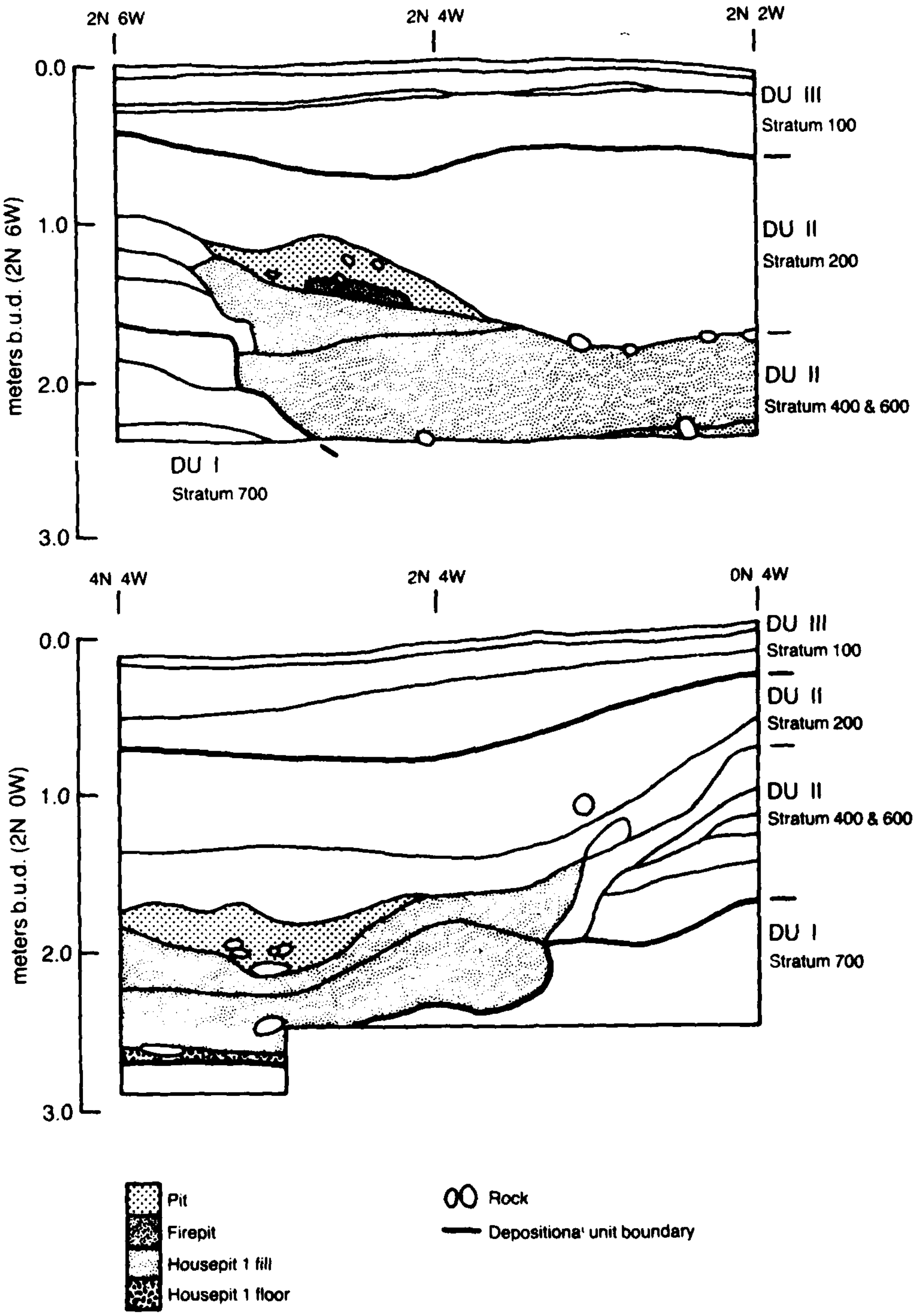


Figure 5-3. Profiles of Housepit 1, Pit 3, and Firepit 3, Zone 13, 45-DO-242. For plan map of Housepit 1, see Figure 5-1.

Housepit 1 at 45-DO-242 is too narrow to have been used for sleeping but may have footed post supports (cf. Chance et al. 1977), or may have been used for storage.

Housepits with benches occur as early as 3500 B.P. in the Thompson River basin of southern British Columbia and are thought to originate there (Nelson 1973). Although our findings do not contradict Nelson's hypothesized pattern of diffusion, Housepit 1 at 45-DO-242 may be old as the Thompson River housepits which Nelson cites. Housepit 1 has not been dated directly, but Housepit 2, also in Zone 13, has been dated to 3900 and 3100 B.P.

Originating at the same level, but outside Housepit 1, is Firepit 1 (1N3W). This small firepit may represent an outdoor activity surface associated with Housepit 1.

Housepit 2 is identified in units 4N26W, 2N30W, 2N28W, 2N24W, 0S28W, and 2S27W (Figure 5-4). Within Housepit 2, both floor and fill were recognized. However, since the feature numbers were not applied consistently, e.g., Feature 23 was sometimes used for fill, and Feature 37 sometimes applied to floor deposits. The material counts in the tables should be taken as approximations of fill and floor materials. Firepit 2 lies near the center of the housepit in 2N27W. It is eroded and scattered over a 100 x 130 cm area. Its 53 fire-modified rocks show no alignment (Figure 5-5). A smaller pit within the floor is visible in the 2N line profile (Figure 5-6). Figure 5-7 shows the distribution of tools across the floor of Housepit 2. Because of the discrepancies in recording the floor, which cannot now be unravelled because of time constraints, we have not compiled more detailed data on floor distributions. The tool distribution, by itself, is not suggestive of any particular spatial distribution of activities.

Housepit 2 is a shallower structure than Housepit 1. It is much larger than the first housepit, measuring as much as eight meters across. Its shape, like that of Housepit 1, is undetermined, but most likely is oblong. On the south and east sides the rims are relatively well-preserved. The north and west boundaries are conjectural. Housepit fill was not recognized in Unit 4N26W (one of the first units excavated); and excavation records and stratigraphic profiles do not agree on the location of the west rim in 2N30W. We have used the excavation data to locate the rim shown in 2N30W in Figures 5-1 and 5-4, and stratigraphic maps to locate housepit fill in 4N26W. A possible northern rim was recorded within Test Pit 2.

The contradictory evidence in 2N30W may result from multiple occupations of Housepit 2. Several facts suggest that this housepit was occupied more than once. In the 26W wall (2S-0S) an earlier floor is obvious below the sloping wall of the main occupation. Heavy charcoal staining also was noted in the lower fill immediately above the floor. Radiocarbon dates of 3912±459 B.P. and 3066±232 B.P. were obtained from the floor of Housepit 2; the discrepancy in dates may also result from reuse of the pit. Both Housepits 1 and 2 originate in the middle of DU II, but whether they are contemporaneous is a moot question.

Two spatially separated aboriginal excavations suggest the existence of a third housepit, Housepit 3. The first was recognized in the field (Feature 38) and the second is a larger pit seen in profile by stratigraphy crews.

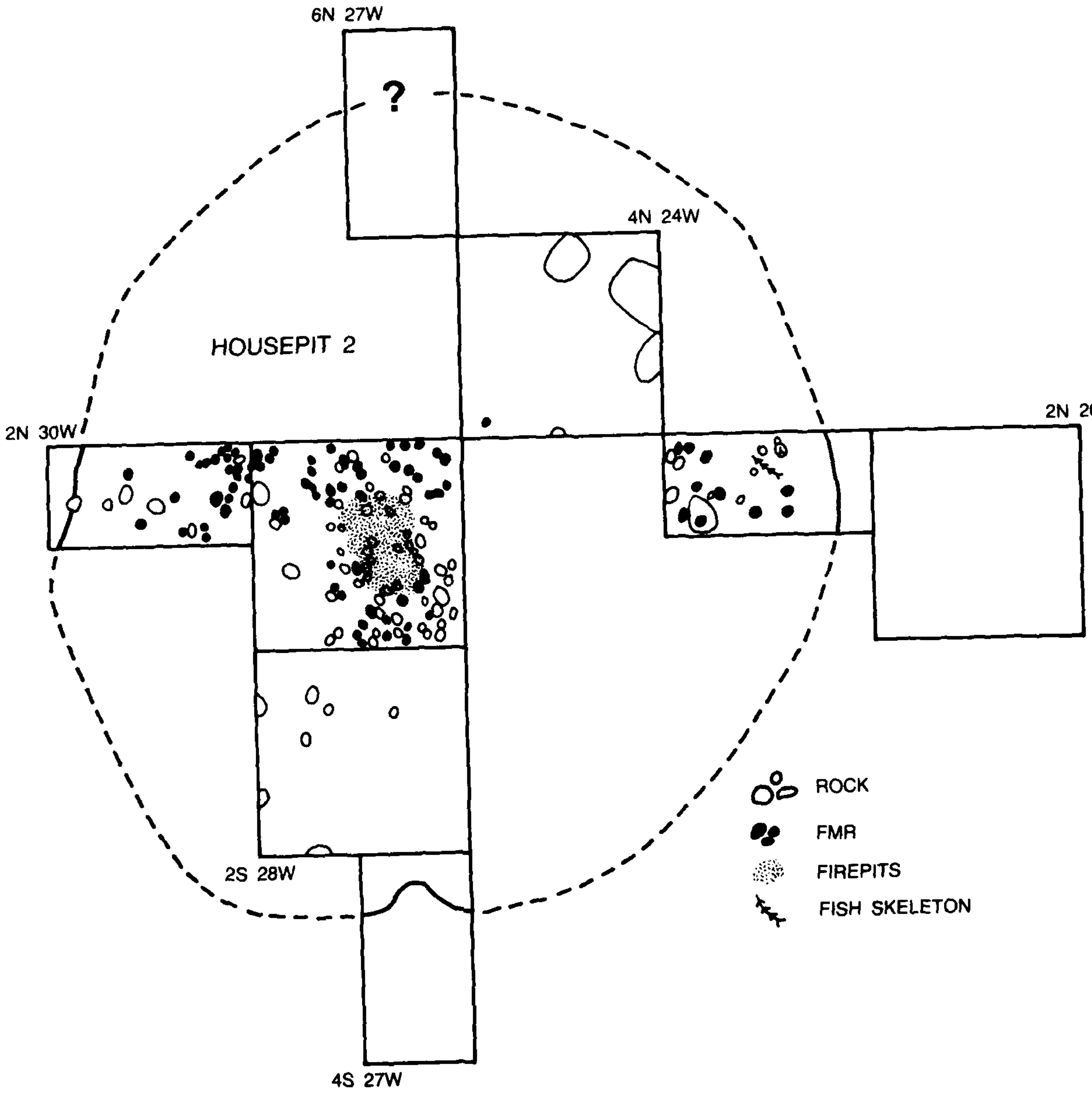


Figure 5-4. Plan map of Housepit 2, Zone 13, 45-DO-242.

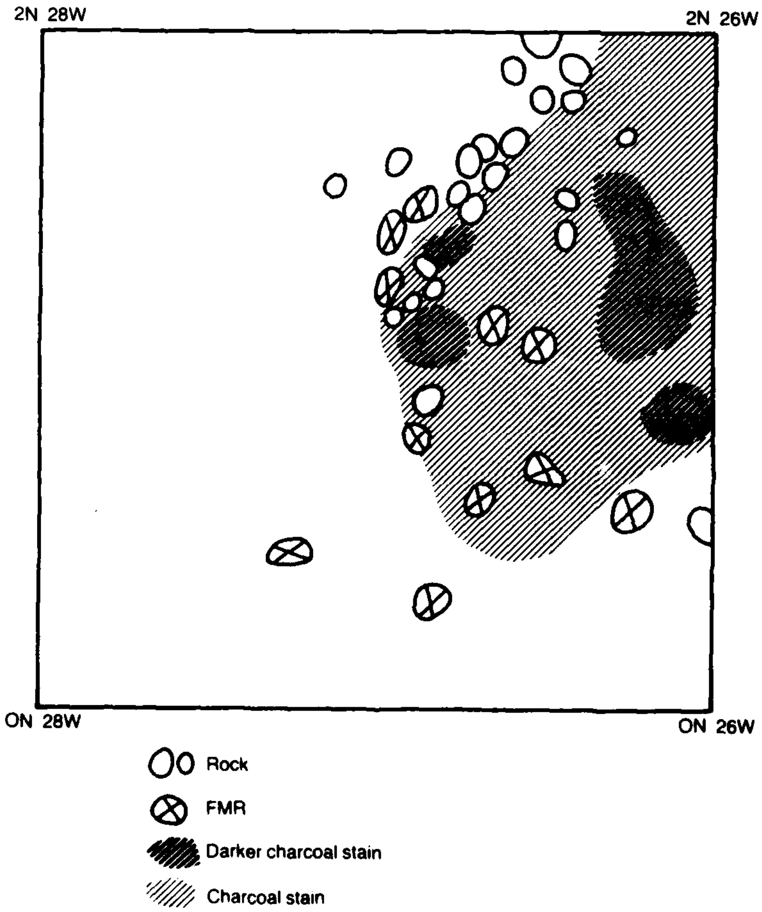


Figure 5-5. Plan map of Firepit 2, Housepit 2, Zone 13 (drawn at 190 cm b.u.d.), 45-DO-242.

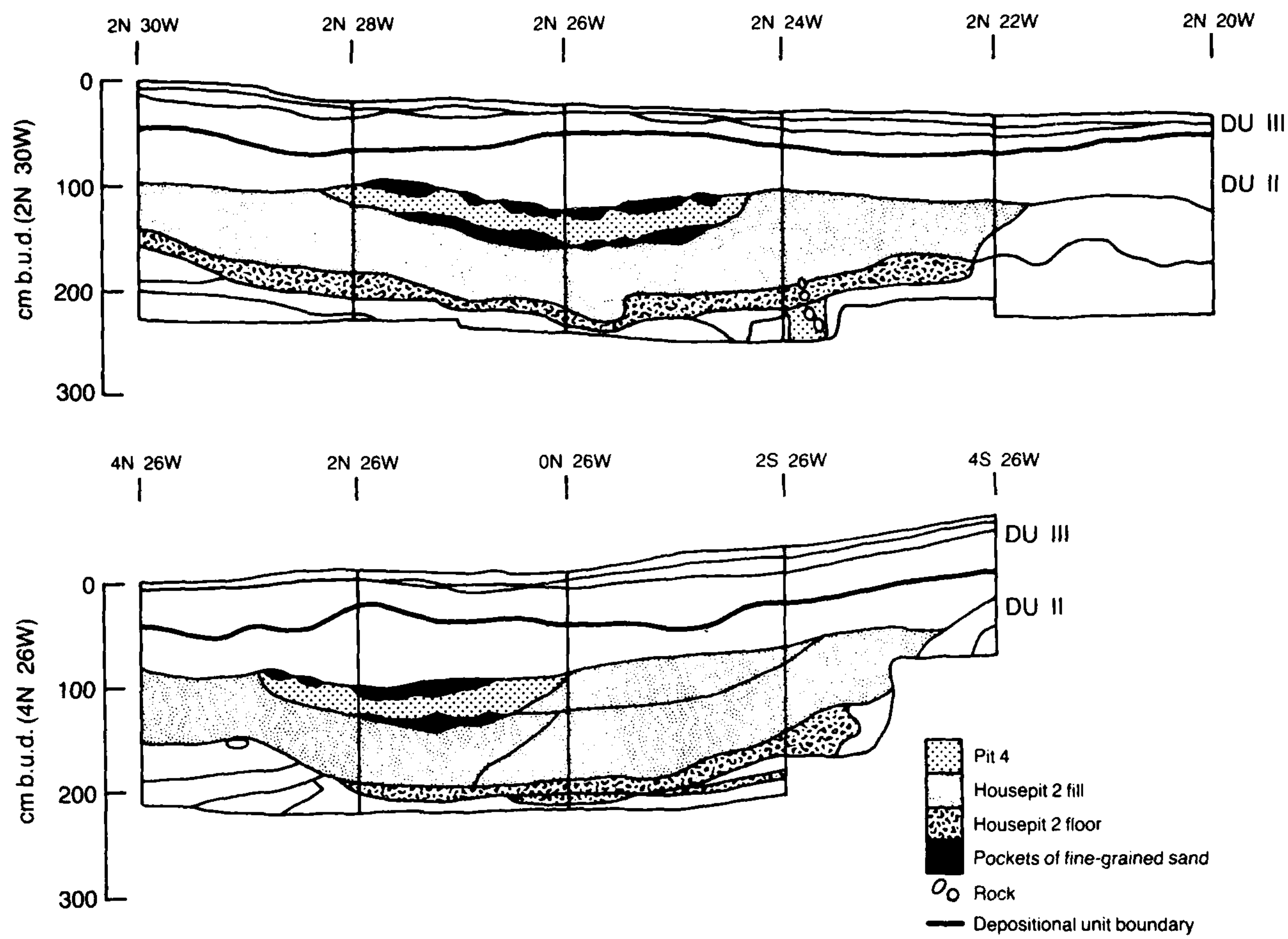
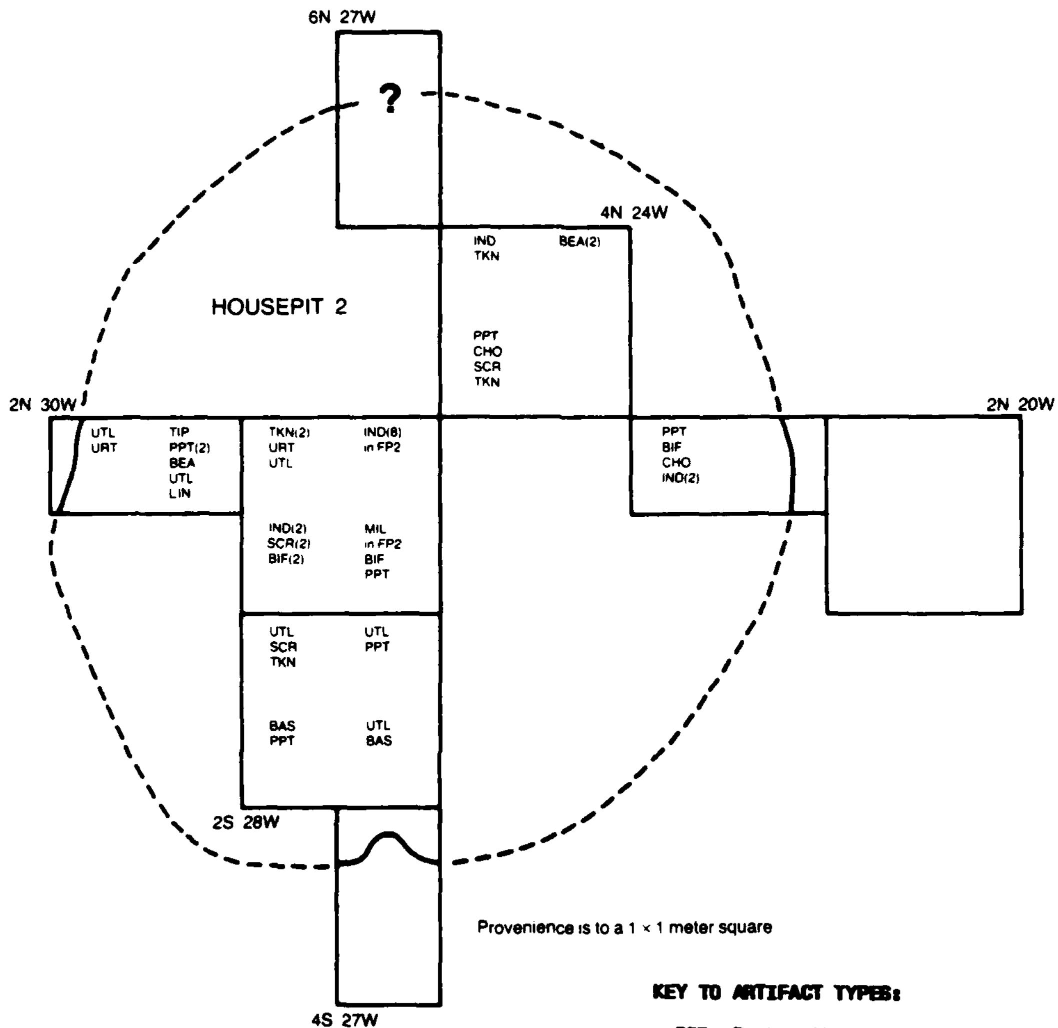


Figure 5-6. Profiles of Housepit 2 and Pit 4, Zone 13, 45-DO-242.



KEY TO ARTIFACT TYPES:

PPT	Projectile point
BAS	Projectile point base
TIP	Projectile point tip
BIF	Biface
BEA	Bead
CHO	Chopper
MIL	Millingstone
SCR	Scraper
TKN	Tabular knife
LIN	Linear flake
URT	Unifacially retouched flake
UTL	Utilized flake
IND	Indeterminate

Figure 5-7. Distribution of lithic artifacts in Housepit 2, Zone 13, 45-DO-242.

Excavators thought that the pit in 4S16W (Feature 38) was associated with the roasting pit in 0S12W (Pit 5, Feature 14). Examination of stratigraphic profiles argues for a different association--between Feature 38 and an even larger pit in which Pit 5 is contained. This larger pit, visible in the 2S and 3S profiles (Figure 5-8), was not recognized during excavation and therefore not given a feature number. We suggest that Feature 38 and this larger pit may be the opposite sides of a single pit, perhaps a housepit. If this is so, Housepit 3 is 5 m across and 75 cm deep, although too little of the housepit was exposed to determine its shape. Like the other housepits in Zone 13, Housepit 3 originates in the middle of DU II. As in Housepit 2, salmon bone within Housepit 3 constitute a major part of the faunal assemblage, which may suggest a spring-fall occupation of these two housepits.

Pit 2 in 2N2E-3E is approximately 120 cm by 90 cm and 30 cm deep. It contained only fire-modified soil and bone fragments. Unlike the other small pits, which generally occur above the housepits, Pit 2 appears to be coeval with Housepits 1, 2 and 3. It too underlies Bone Concentration C, a later Zone 13 feature (Figure 5-9), and it truncates the sterile yellow sandy layer at the base of excavation. Only the housepits and Pits 1 and 2 are dug into this sandy layer.

A large bone feature (Bone Concentration B) was found in the middle of Zone 13 deposits at the western end of the site (Figure 5-1). Nearly two cubic meters of the concentration were removed and over 8600 bone fragments (Table 5-3) recovered from a shallow depression overlying the cobble stratum (Figure 5-10). Deer is the most abundant taxon (Table 5-4). Many of the fragments lay haphazardly on top of each other, but many others were articulated. A few areas of crushed bone were located, including mountain sheep horn (shown in Figure 5-10). Of the bone collected, 484 were identified (5.6%, a fairly high proportion) and many of these showed signs of burning and/or butchering. Among the deer bone, almost all body parts are represented--jaws, teeth, limbs, shoulders, vertebrae, skull--except antler, which is conspicuously absent. This is in sharp contrast to the mountain sheep bone which consists primarily of the horn core fragments. Taken together, the quantity and variety of bone that make up this concentration are unique. Only 14 formed objects were recovered, fewer than we would expect if Bone Concentration B resulted from _in situ_ butchering or processing. Given the quantity of bone, the variety of body parts represented, and the small number of tools, we might interpret this concentration as a midden or dump; we cannot know, however, if other tools or material more reflective of primary activity were removed after use.

These features represent the earlier Zone 13 occupation. All are overlain by later Zone 13 features or deposits. The later Zone 13 occupation is also intensive, although it does not represent a long-term habitation. No pit houses are recorded, but several large cooking pits and artifact concentrations occur. The number and variety of artifacts and debris in features show no decrease from the pit house levels.

Overlying Housepit 1 is Pit 3, a series of pits dug into the depression above Housepit 1 in units 2N6W, 4N6W and 3N4W (Figure 5-3). Excavators judged that at least three separate pits overlap in this area. Boundaries between

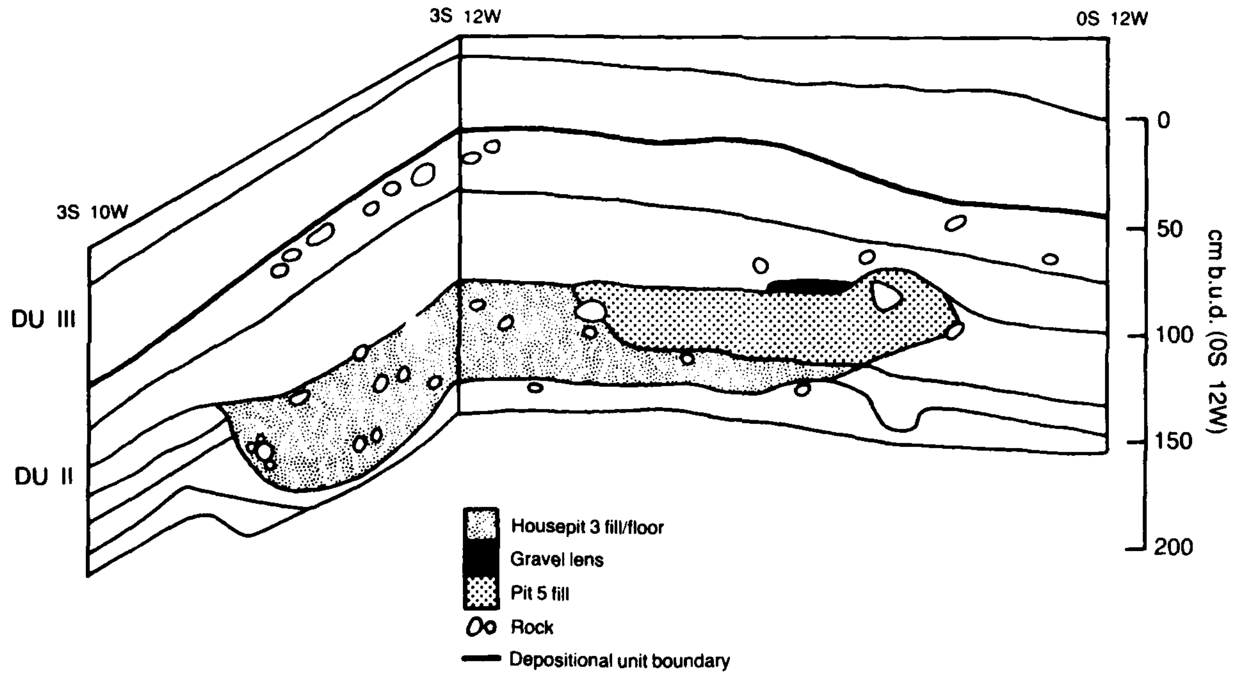


Figure 5-8. Profile of Housepit 3 and Pit 5, Zone 13, 45-DO-242.

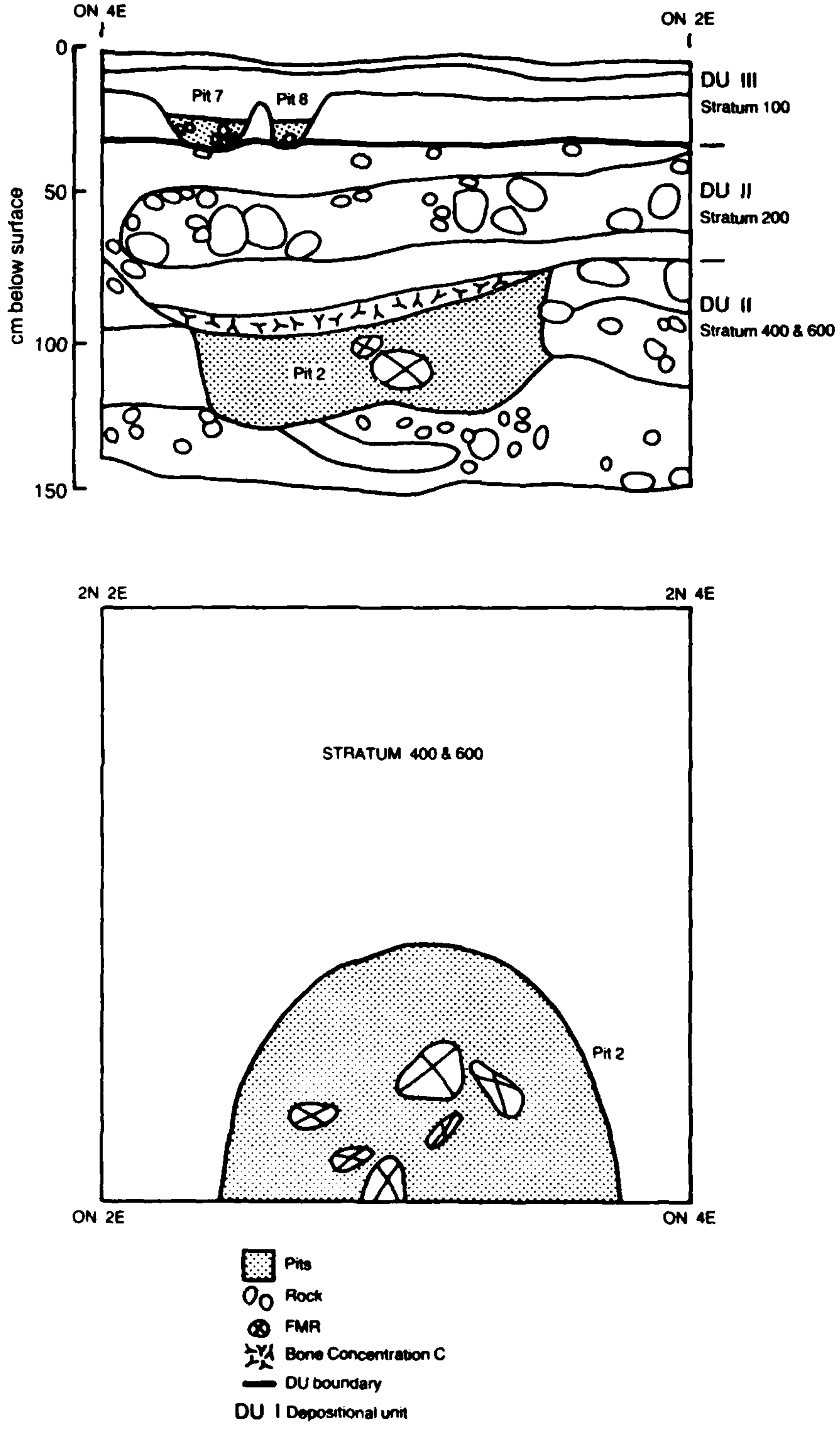


Figure 5-9. Profile of Pits 7 and 8 (Zone 11), Bone Concentration D (Zone 12), and Pit 2 (Zone 13), and a plan map of Pit 2, 45-OO-242.

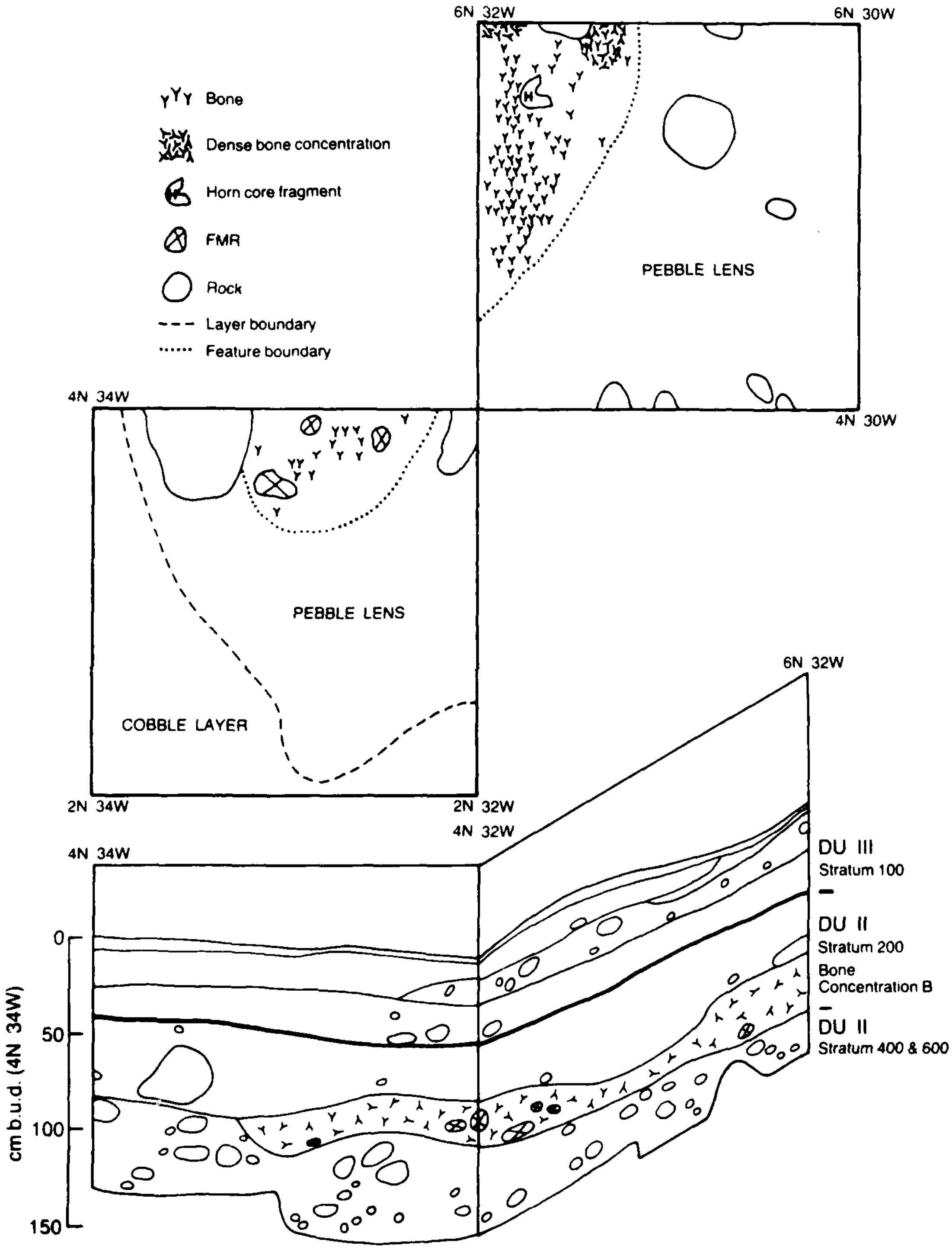


Figure 5-10. Plan map and profile of Bone Concentration B, Zone 13, 45-DO-242.

the pits were not clear during excavation or in profile, and they are treated as a single feature. Pit 3 covers an area at least 250 cm long (north-south) and 200 cm wide, and yielded concentrations of charcoal, fire-modified rock, and shell throughout. A hearth area 65 cm across and 13 cm deep within Pit 3 (visible in Figure 5-3 in the 2N6-4W line) has been designated Firepit 3.

An examination of Tables 5-3, 5-4 and 5-5 reveals several distinctive characteristics of Pit 3. First, over 2300 shell hinge fragments were recovered from it, far more shell than any other Zone 13 feature, and even more than the shell concentrations of Zone 11 (Table 5-3). The number of bone and fire-modified rock is also quite high. There are far more cutting and scraping than pounding tools; utilized or retouched flakes and bifacially worked objects occur in quantities similar to those found in housepits. Finally, the list of identified bone from Pit 3 is unique in its variety. One hundred and twenty-one of the mountain sheep bone fragments identified are horn core fragments, representing a single horn core (see Chapter 4). Eight pieces of dog bone--a complete left mandible and articulated incisors and molars-also were found within the pit. Dog bone fragments in levels immediately above Pit 3 included tibia, tarsal, femur, calcaneum, and astragalus fragments.

In sum, Pit 3 appears to be a conglomeration of pits dug into the sandy fill above Housepit 1. The presence of heavy charcoal staining and the abundance of bone and shell fragments suggest it was the scene of intensive use, cooking and probably trash disposal as well.

Pit 4 overlies Housepit 2 in 2N28W (Figure 5-6). It is the largest of the non-house pits, measuring 5.8 by 4.0 m. It represents the use, and possible modification, of the natural depression above Housepit 2. The feature consists of a sandy fill (Feature 34) between thick lenses of silt (Feature 32 above and Feature 36 below). Apparently, the silt settled into the natural depression left by the in-filling of Housepit 2, and later served as an occupation surface. After its abandonment, Pit 4 was filled by the ubiquitous brown loamy sand and sealed by another layer of silt. Pit 4 may have been modified to some extent--a possible rim can be seen in profile on the north and east sides (Figure 5-6)--and used as a shallow (summer?) pit dwelling. However, the presence of a pit structure was not demonstrated in the field, and laboratory evidence of such a dwelling is extremely tenuous. Therefore, we have not labelled this feature a housepit.

Pit 5 (Feature 14) lies within and originates at nearly the same level as Housepit 3 (Figure 5-8). It is a large roasting pit, filled with black and red-stained soil and fire-modified rocks. The staining, while not uniform, was intense in several spots, suggesting either several areas of intense heat in the single pit or the existence of several pits. At least two pits were noted during excavation. The spoil dirt from the second obscures the northern rims of the first and of Housepit 3 (the lump of charcoal-stained soil at the north edge of the pit in (Figure 5-8). If this is a roasting pit, it may have held vegetal foods; many FMR and relatively few bone fragments were recovered.

Bone Concentration C lies above Pit 2 in 2N2E (Figure 5-9). This feature consists of nearly 600 bone fragments, a few tools, and waste flakes scattered over a 1 x 1-m area in a sandy matrix. Bone Concentration C represents an

activity surface or dump on the fill of Pit 2 in the second half of the Zone 13 occupation.

FMR Concentration A is a collection of 14 fire-modified rocks in 6N31W (Figure 5-1). No staining or other material is associated with the rocks. This feature is 45 cm in diameter and is stratigraphically above Bone Concentration B, which occurs in the same unit.

Pit 6 is a shallow, nearly circular pit originating in the yellow brown sand in 6N4E (Figure 5-1). It measures 72 by 87 cm at its largest dimensions, although its boundaries were indistinct. Its fill consists of fire-modified rock, black charcoal staining, and several hundred bone fragments, of which only deer bone was identified. The larger bone fragments appear aligned near the outer rim of this roasting pit. Pit 6 is not associated with any other Zone 13 feature. Its placement in the later portion of the Zone 13 occupation is based on the fact that, stratigraphically, it occurs near the upper boundary of the zone.

ZONE 12

Features in Zone 12 consist only of fire pits and debris concentrations (Figure 5-11). The lack of structures or pits indicates a shift in the site's function from a habitation in Zone 13, to short-term, sporadic activities. Although a detailed internal feature sequence cannot be constructed for Zone 12, superposition and stratigraphy clearly indicate that some Zone 12 features are older than others.

Firepit 4 is located in 6N4E. The upper levels contain nearly 200 fire-modified rocks and stained soil spread over the entire unit; in the lower levels, the fire-modified rocks are more concentrated (Figure 5-12). The function of this firepit and its associated surface is unknown. Very little bone or shell occurs with Firepit 4 (Table 5-3).

Firepit 5 is not a structured pit, but rather evidence of intense burning in the southern half of 1S8E (level 20). It is a 100 x 40 cm area of bright orange soil. As in the case of Firepit 4, little cultural material was found.

Firepit 6 is a roughly circular (70 x 60 cm) concentration of charred wood, some fire-modified rock, and carbon-stained soil in 4N5W. A hopper mortar base was taken from Firepit 6; a biface and scraper were recovered from the sandy matrix. A radiocarbon sample from this feature yielded a date of 556±89 B.P., about midway between other dates from Zone 12.

Four other features in Zone 12 are concentrations of debris, ranging from small, sparse conglomerations to large scatters. Most occur within a general, sitewide cultural stratum (Feature 4) which has been dated at 701±85 B.P. (TX-4173) and 340±70 B.P. (Feature 4 is not discussed here because the field designations given unrelated units, include several occupations from both Zones 11 and 12.) Bone Concentration D is a sloping stratum of stained soil with 700 bone fragments, fire-modifed rock, and some lithic debris in association. The bone fragments lay in and above a layer of cobbles. None of the identified bone carried butchering scars, but that does not preclude butchering as the primary activity. Bone Concentration E is a similar but smaller concentration of bone, debris and charcoal mottling in 1N22W and

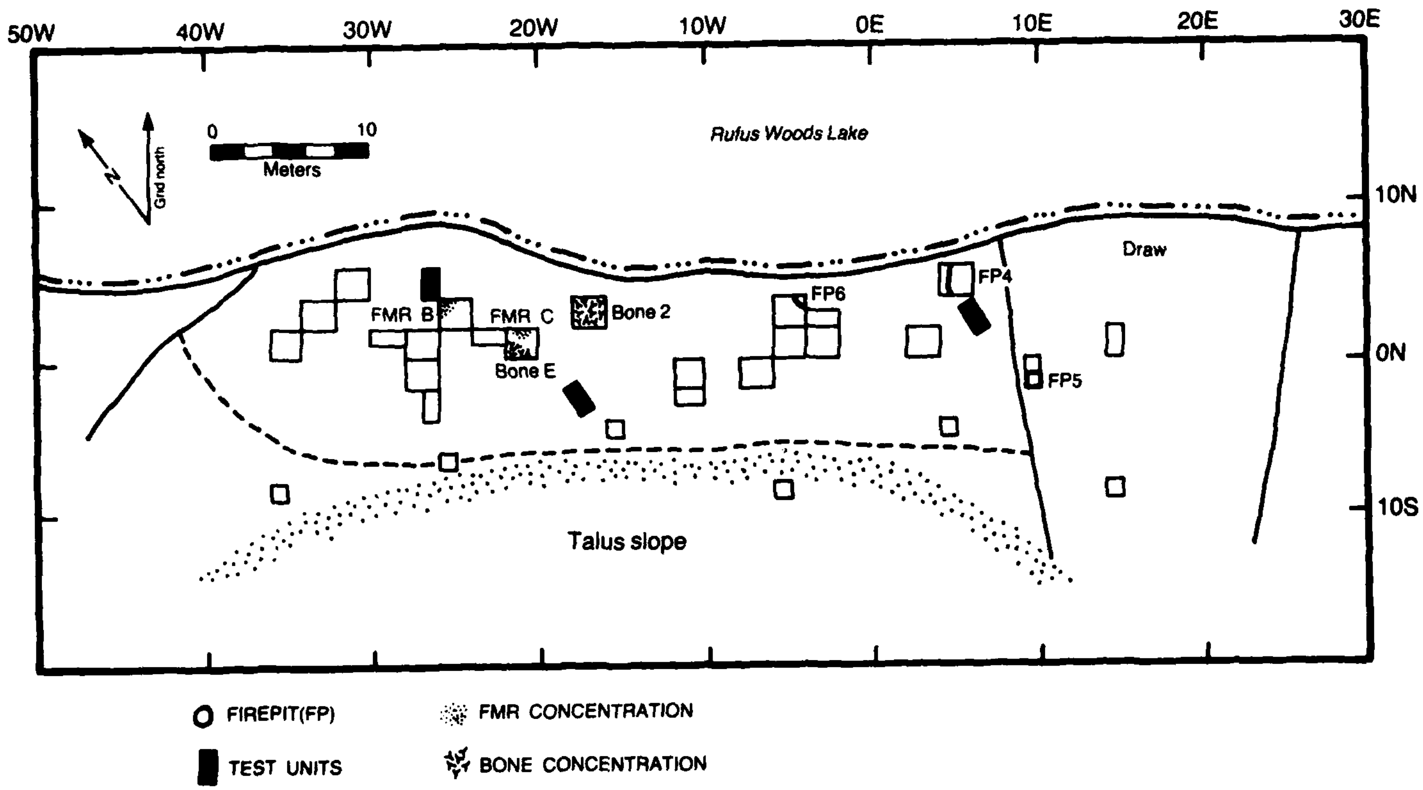


Figure 5-11. Plan map of cultural features, Zone 12, 45-DO-242.

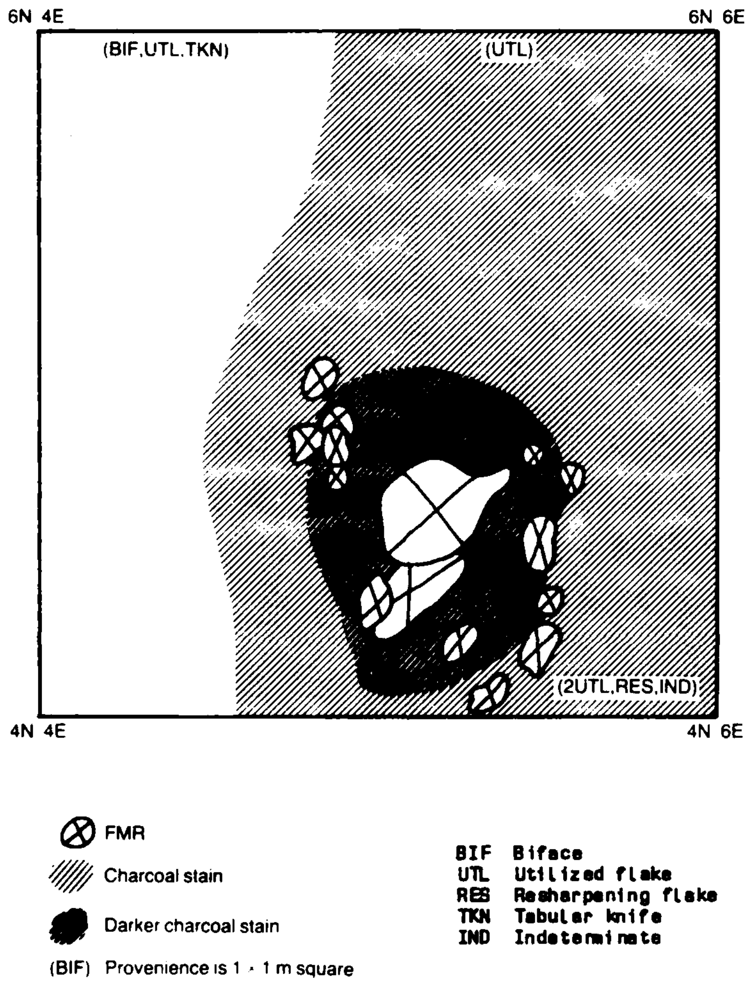


Figure 5-12. Plan map of Firepit 4 and associated use surface (at 20 cm b.u.d.), Zone 12, 45-DO-242.

1N21W. FMR Concentration B consists of 46 fire-modified rocks in 4N26W. The surrounding soil was not darkened or stained in any way, so the presence of a firepit cannot be proved. The rocks seemed to be piled on one another, rather than placed in a pit (Figure 5-13). They may be stones dismantled from an earth oven or perhaps a pile of boiling stones. FMR Concentration C contains 10 fire-modified rocks without any associated debris or stained soil. This feature, like the previous one, may be stones dismantled from a hearth. It occurs in the same unit and stratigraphically below Bone Concentration E.

ZONE 11

Four distinctive features occur in Zone 11 (Figure 5-14). Unlike Zones 13 and 12, however, no substantial pit features or bone concentrations were excavated in Zone 11.

Pits 7 and 8 are two small pits of unknown function, located side by side. They were not recognized during excavation, but were drawn by stratigraphy crews in the south wall of unit 2N2E (see Figure 5-8). Both pits originate in the loamy sand which immediately underlies the organic mat/surface layer. Their fill is a coarse sand and small gravel matrix, interspersed with occasional thin bands of fine sand. The larger pit is about 25 cm in diameter and 20 cm deep, and the smaller about 10 cm across and 20 cm deep. Their shape suggests that they may have held conical boiling baskets.

Shell Concentration A occurs in three different units (2N28W, 4N26W, and 0S28W), indicating a large use surface or cultural stratum. A single firepit (Firepit 7, Feature 30), an area of bright orange soil (Figure 5-15), was found within this shell feature. Oblong in shape, 75 x 45 (north-south) cm and 20 cm deep, Firepit 7 is characterized by its stained soil, the lack of shell (despite an abundance of shell on the surface in which the firepit originates) and a whole turtle plastron recovered from the edge of the burnt area. A radiocarbon sample from Shell Concentration A is dated at 237±80 B.P.

Shell Concentration B contains shell, bone and fire-modified rock within a confined area of dark stained soil in 4N6W and 2N6W. Part of a larger, productive cultural stratum (Feature 4; see above), this shell concentration probably results from limited use (perhaps confined to a single activity) on this spot.

Lithic Concentration A consists of formed lithic objects and waste flakes in 5N32W. Ten projectile points or fragments as well as worked flakes, bifaces, and a linear flake (Table 5-5) make up this feature. In addition, nearly 200 jasper waste flakes and other debitage (Table 5-6) are part of this assemblage, a large quantity indeed for a feature of this size at this site. This lithic concentration occurs on a surface which marks the break between Zones 11 and 13 in this unit (6N32W; Zone 12 did not occur here). Projectile points from this feature are discussed in detail in the stylistic section of the artifact chapter.

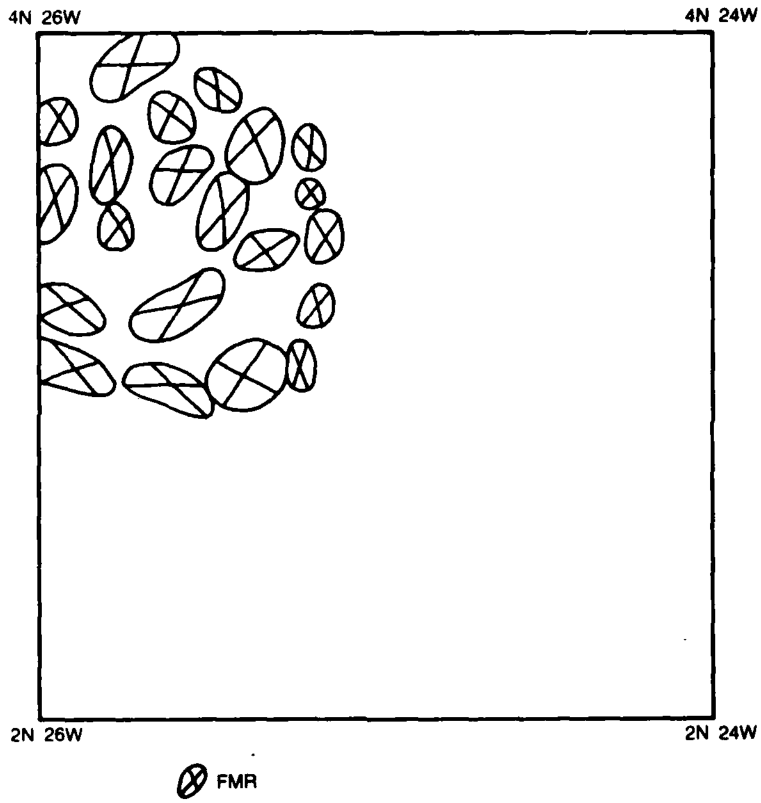


Figure 5-13. Plan map of FMR Concentration B, Zone 12, 45-DO-242.

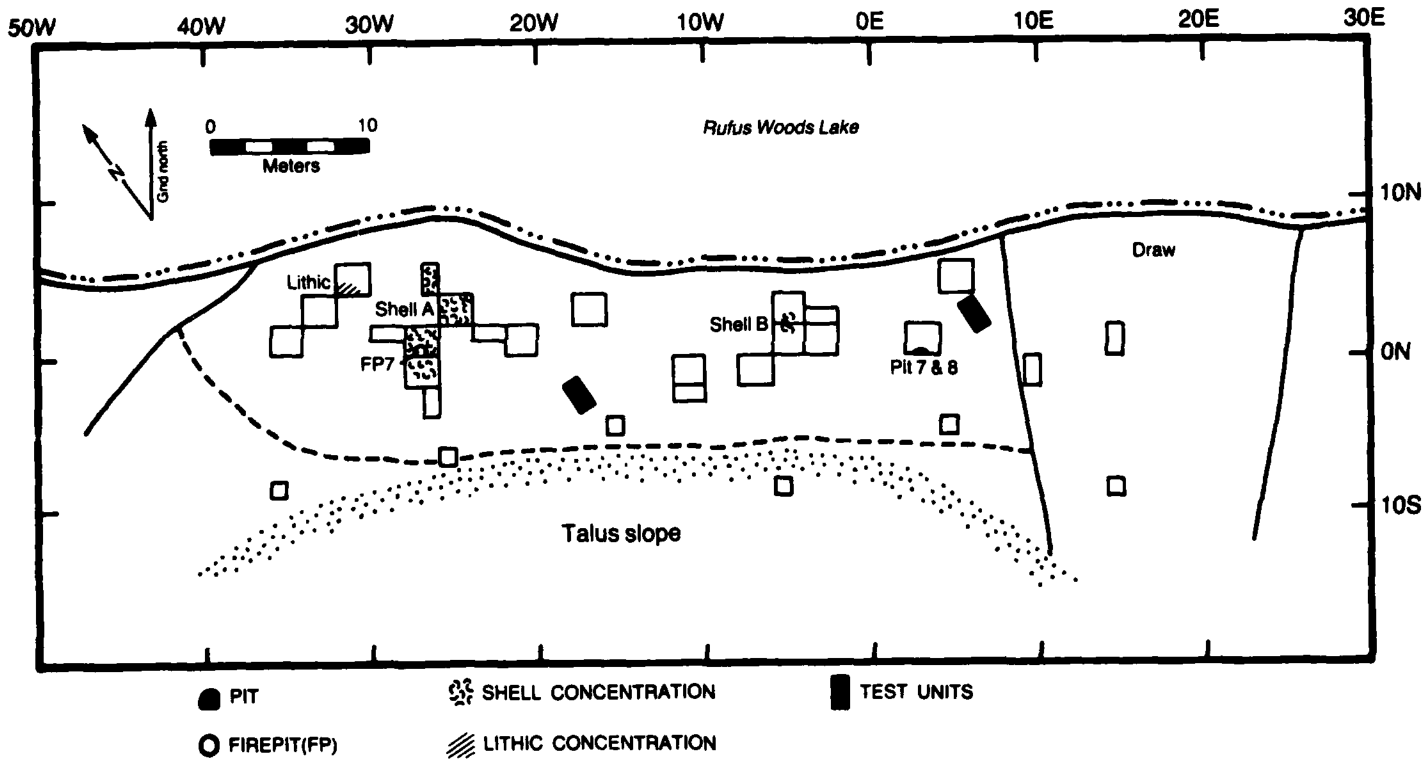


Figure 5-14. Plan map of cultural features, Zone 11, 45-DO-242.

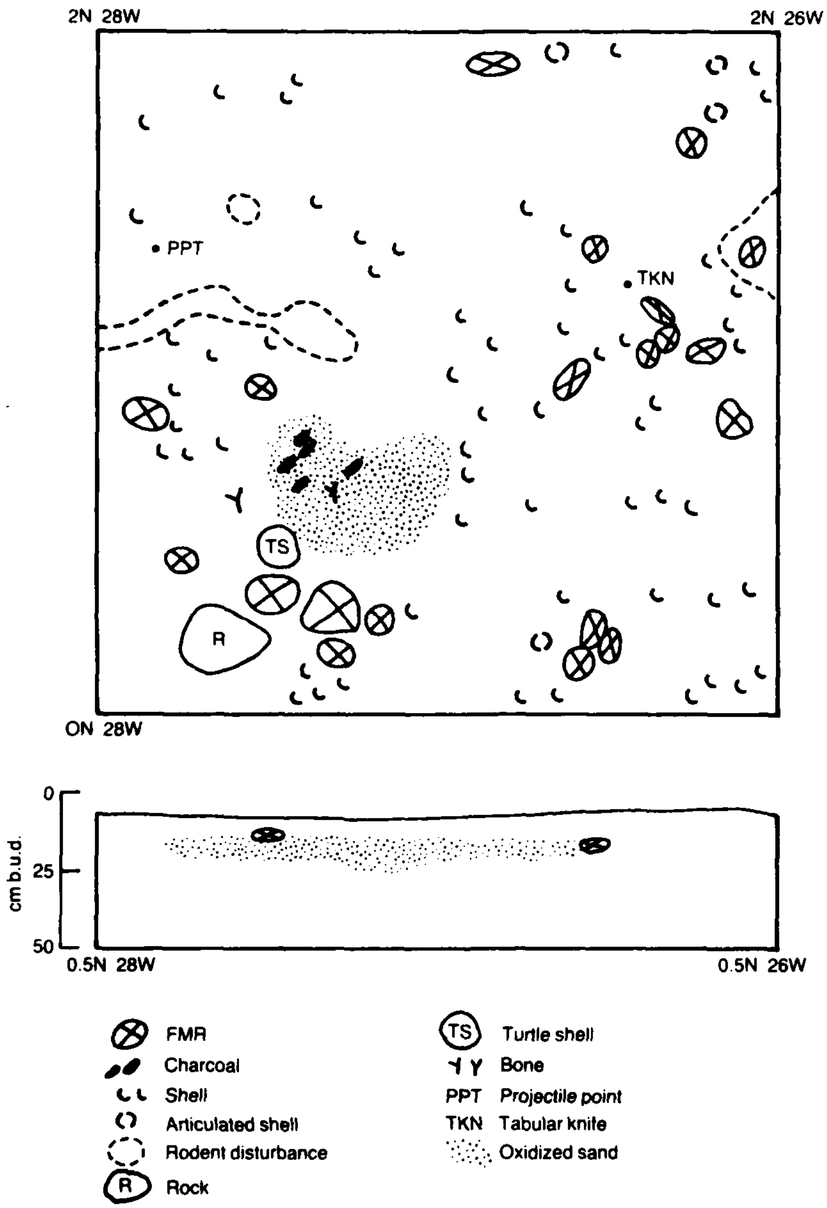


Figure 5-15. Plan map (at 25 cm b.u.d.) and profile of Firepit 7 and Shell Concentration A, Zone 11, 45-DO-242.

SUMMARY OF FEATURES AT 45-DO-242

The 29 features recorded at 45-DO-242 demonstrate marked changes in both the extent and function of occupation through time.

The features of Zone 13, over half of the total cultural features, indicate intensive and raised use of the site at this time. The presence of three housepits suggests long-term residence at the site, although we have little hard data about the season of residence. While Housepit 2 may have analogues in ethnographic "winter" houses [e.g., of the Sanpoil (Ray 1932) or Okanogan (Spier 1938)], Housepit 1 has no known parallels in the ethnographies. We cannot draw conclusions about seasonality merely from the presence of housepits. We can be sure, however, that occupation at 45-DO-242 was of some duration during Zone 13. We base this inference on the multiple floors in Housepit 2, evidence of reuse and of use over a span of time; and on the depth and elaborate nature of Housepit 1, evidence of considerable labor and, by extension, perhaps of sedentism. Yet the excavations at 45-DO-242 do not allow us to determine the manner of housepit construction nor the size of the resident group.

From the cultural features of Zone 13, we may also infer that the types of activities at the site changed over time. During the accumulation of Zone 13 deposits, site use seems to have shifted from long-term residence, as indicated by the housepits, to still intensive, but short-term occupation. Pits 3, 4 and 5, overlying Housepits 1, 2 and 3, are evidence of continued use of the site through Zone 13. However, none has the appearance of a long-term or permanent residence. Pit 5 is a large roasting pit which shows signs of reuse; Pit 3 is a conglomeration of smaller cooking pits; and Pit 4 may have been a shallow pit dwelling. All the same, these and other features--butchering areas, occupation surfaces and smaller pits--add to the full testimony of the varied activities that took place at 45-DO-242 during the accumulation of Zone 13 deposits.

The features of Zone 12 and 11 are in marked contrast to those of Zone 13. Pit features are lacking in Zone 12, although the concentrations of bone and debris and the firepits resemble those of the previous zone. Zone 11 is characterized by two shell concentrations and a concentration of lithic tools, especially small side-notched projectile points. These points confirm that Zone 11 was occupied very late in the Rufus Woods Lake Sequence, while the shell concentrations, which occurred only in this zone, suggest a different site function during this time.

These shifts in feature types from zone to zone may parallel shifts in site function through time. Certainly, Zone 13 represents a period of intensive occupation, possibly a winter habitation. Later in Zone 13, a seasonal or functional change occurred as deep housepits were overlain by outdoor cooking pits and possibly shallow pit dwellings. However, the intensity of the occupation, as measured by number of features and artifacts, did not diminish. In Zone 12, only firepits and debris concentrations are recorded; and in Zone 11, we have no evidence of long-term or intensive activity. During this period, the site probably served as a hunting camp and, during the accumulation of Zone 11, as a shellfish processing station.

FEATURES AT 45-DO-243

Cultural features at 45-DO-243 consist of shell concentrations, small pits, a possible housepit, and a possible firepit. These features are distributed among the lower three analytic zones. No cultural features were recorded in Zone 21. Material recovered from the cultural features is shown in Table 5-1.

ZONE 24

Shell Concentration A occurs in 3S12E. The boundaries of the concentration were diffuse so the entire 1 x 1-m square was collected as part of the feature. Even so, very little material (9 bone fragments, 19 shell hinge pieces) was recovered.

ZONE 23

A small pit and two more shell concentrations occur in Zone 23 (Figure 5-16). Pit 1 first appeared to excavators as an area of diffuse charcoal staining in the floor of 5N0E in level 40. The charcoal staining was never concentrated and never extended more than 20 cm from the walls of the unit (Figure 5-16). Because of its vague boundaries and uncertain character, Pit 1 was not defined as a feature until level 70, and it terminated at 78 cm b.u.d. Previously excavated levels were assigned to the feature after the fact, so material counts for Pit 1 in Table 5-3 reflect unit levels as well as the pit itself. Among the material recovered are nine salmon vertebra fragments, a linear flake and two utilized flakes. The lithic debitage is primarily jasper (56 of 64 pieces). Figure 5-17 shows Pit 1 in profile. The pit originates at the bottom of a fine sand stratum and extends into layers of medium and coarse sand below. Obvious charcoal staining occurs in the unit levels above and in the pit itself. Because of the charcoal staining and bone fragments, we assume Pit 1 to be a roasting pit, apparently part of a larger activity area.

The larger of the two shell concentrations, Shell Concentration B, is a thick layer of shell and cultural material in 8N18W. Small flecks of charcoal and diffuse charcoal staining were mixed with the sandy parent matrix. Collected with the shell from the arbitrarily defined feature area were two tabular knives, two flakes of coarse quartzite and two of opal, an unburned deer mandible with a molar and three premolars, six complete salmon vertebrae and six vertebra fragments. As can be seen in Figure 5-18, Shell Concentration B occurs in a charcoal-filled stratum and probably represents a midden area used during a period of frequent or intensive site occupation. Pit 2 in Zone 22 overlies this shell and bone concentration.

Shell Concentration C also contains a few bone fragments in a stained sand matrix, immediately below the cobble-gravel layer which overlies most of the site. Unlike its larger counterpart, this area in 2N12W apparently results from a single, short-term activity.

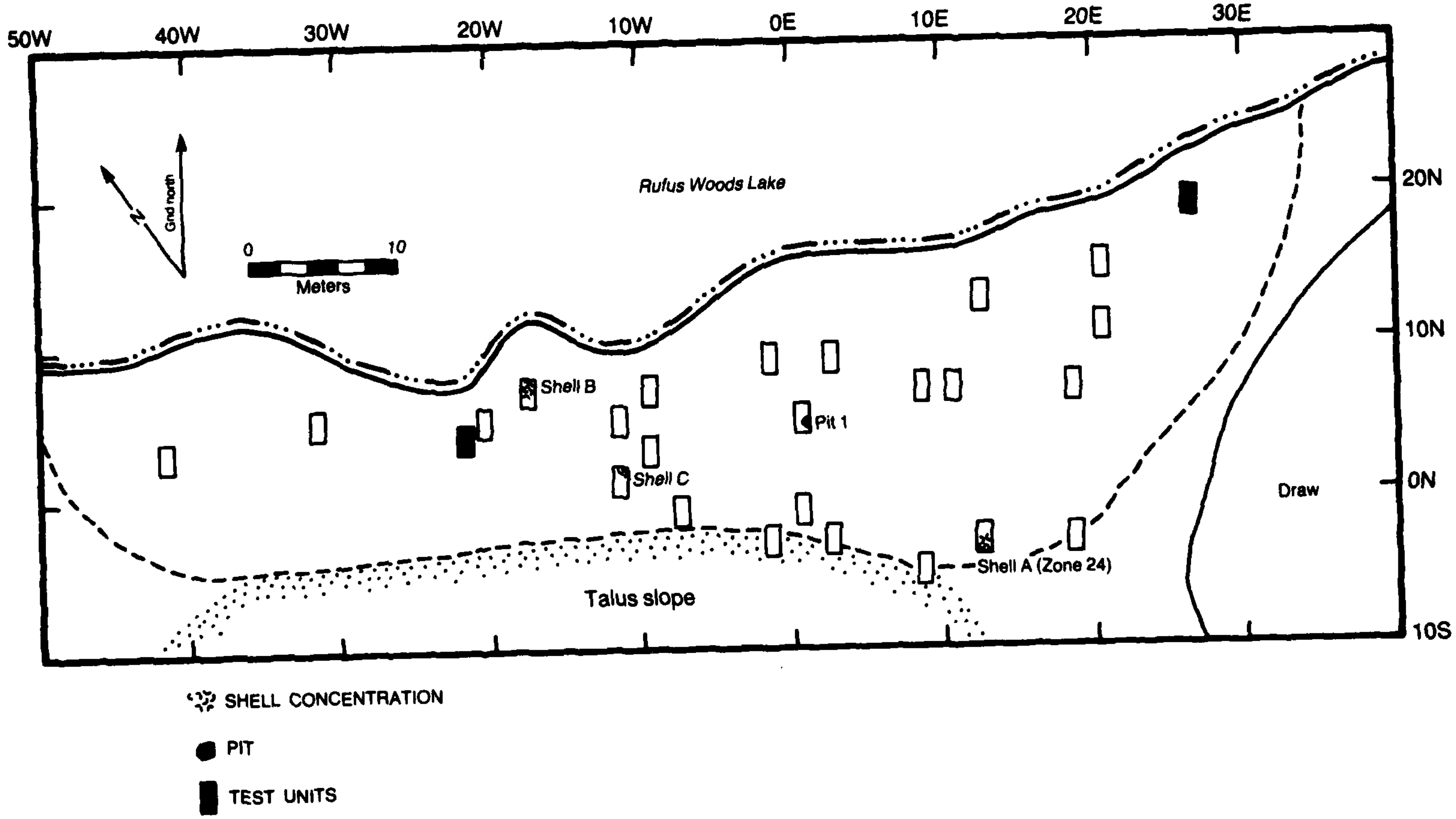


Figure 5-16. Plan map of cultural features, Zones 23 and 24, 45-DO-243.

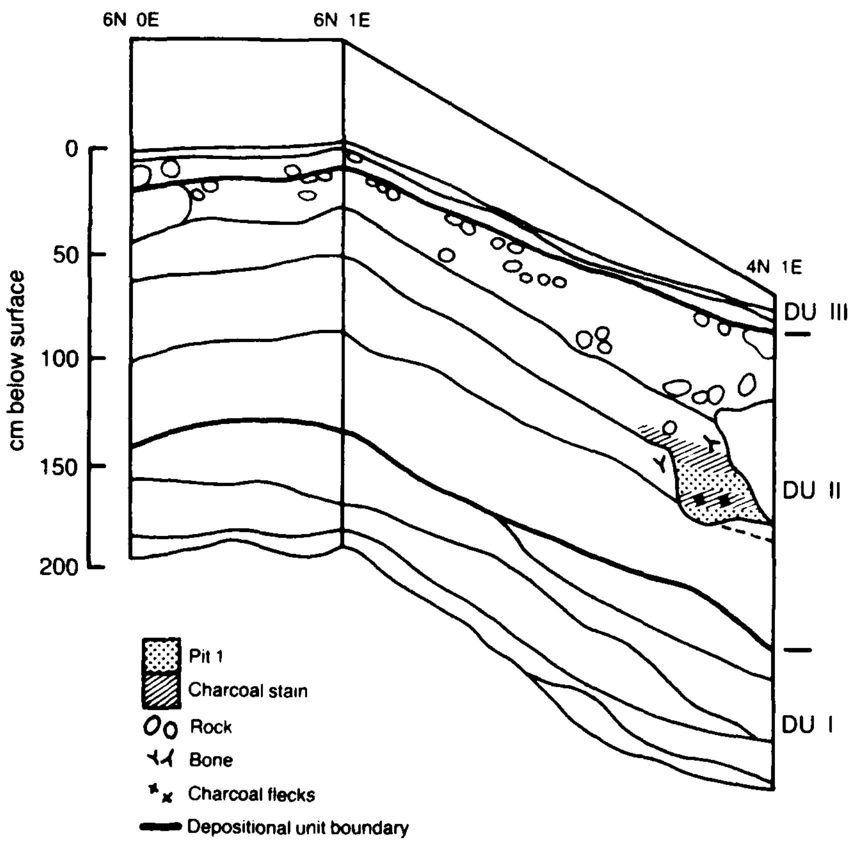


Figure 5-17. Profile of Pit 1, Zone 23, 45-DO-243.

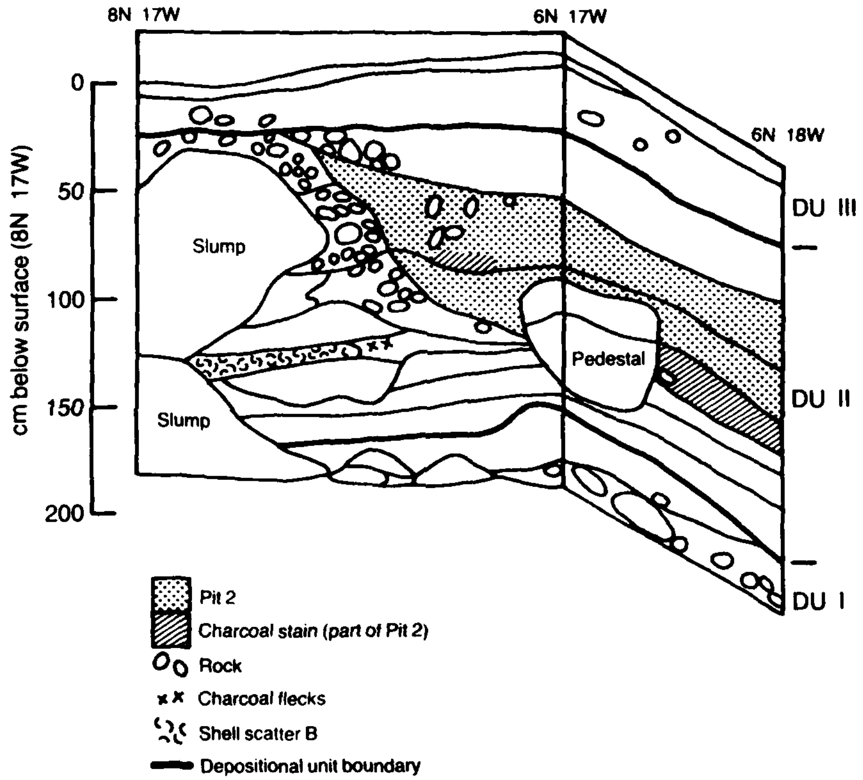


Figure 5-18. Profile of Pit 2, Zone 22, and Shell Concentration B, Zone 23, 45-DO-243.

ZONE 22

Zone 22, radiocarbon dated to 1500 B.P. (see Chapter 2), contains the widest variety of features at 45-DO-243 (Figure 5-19). A shell concentration, a firepit or hearth, and a large pit suggest a more intensive occupation during the accumulation of this zone than of others.

Pit 2, in 7-8N18W, is a deep pit feature which in profile suggests a housepit. Although the plan maps indicate a much smaller structure than a housepit, it is possible that excavators only recorded the areas of most intense staining and failed to notice more subtle indications in the south half of the unit (e.g., charcoal staining mapped but not featured). Pit 2 originates at the top of and truncates the cobble-gravel stratum which underlies the site surface. It is about 90 cm deep. Like Pit 1, it contains a large quantity of bone fragments, and a lesser quantity of shell. Among the identified bone are two mountain sheep and two deer-sized bone fragments, and a deer mandible with three premolars articulated.

Firepit 1, in Unit 14N12E (Figure 5-20), is dug from the middle of a fine brown sand stratum to the surface of a stratum of yellow sand. This sandy surface was burned and altered by the fire. The area may have been used more than once: a deep, narrow pit extends from Firepit 1 through the burned sand into the stratum below. A band of charcoal staining, the intensity of which decreases with depth, separates this narrow pit from Firepit 1. Firepit 1 is 120 cm across and about 25 cm deep; the second pit extends another 25 cm below Firepit 1 and is approximately 25 cm across. Only some bone fragments and lithic debitage are associated with this firepit.

Shell Concentration D occurs in 6N12W, levels 110 and 120. Over 80 shell hinge pieces and a few flakes and bone fragments were scattered over an area roughly one meter square (the south half of 6N12W and the north half of 5N12W). This feature contained neither associated charcoal nor formed objects.

SUMMARY OF FEATURES AT 45-DO-243

Limited in number, the cultural features at 45-DO-243 yield little direct evidence about site function or changes over time. Concentrations of shell occur in all three analytic zones in which cultural features are found. Although often found with diffuse charcoal staining, shell concentrations do not contain fire-modified rock, nor do they occur in small pits or fire pits. The presence of bone fragments in pits and the predominance of shell hinge pieces in surface concentrations clearly indicate the two food types were prepared differently. This is borne out by ethnographic studies (e.g., Ray 1932) which state that shellfish were boiled or steamed, while salmon and large game were roasted. In addition, ethnographic data Spier (1938) cited in Collier et al. 1942:95 imply that mussels were gathered primarily by individuals, except in times of famine when groups would camp by productive mussel beds. Like Collier et al. (1942:95-96), we take our discrete shell concentrations to be the result of short-term, individual activity, although

AD-A160 949 ARCHAEOLOGICAL INVESTIGATIONS AT SITES 45-DO-242 AND 45-DO-243 CHIEF JOSEPH DAM PROJECT WASHINGTON(U) WASHINGTON UNIV SEATTLE E S LOHSE ET AL. 1984 3/3

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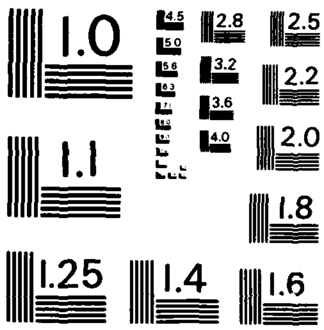

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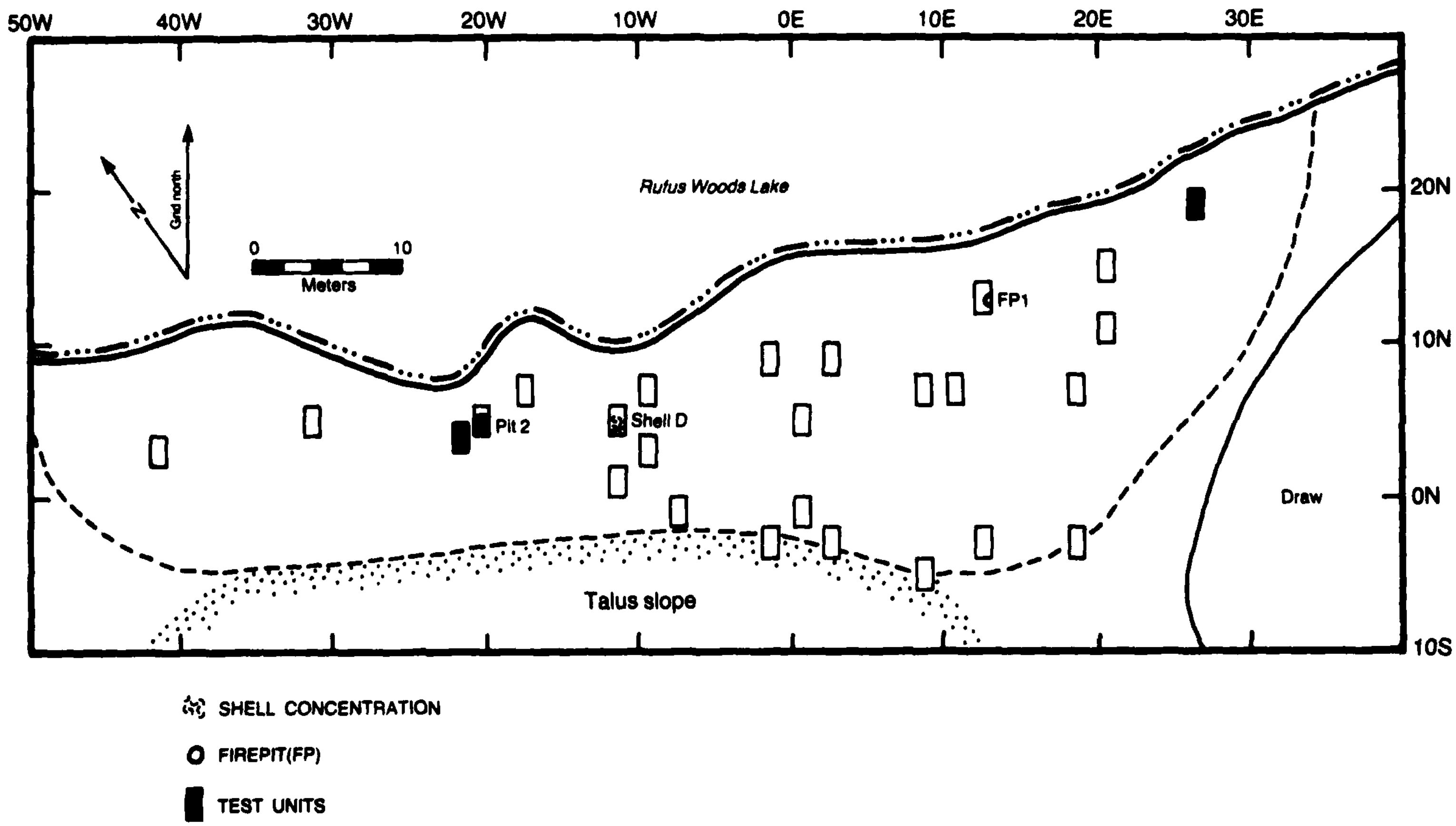

Figure 5-19. Plan map of cultural features, Zone 22, 45-DO-243.

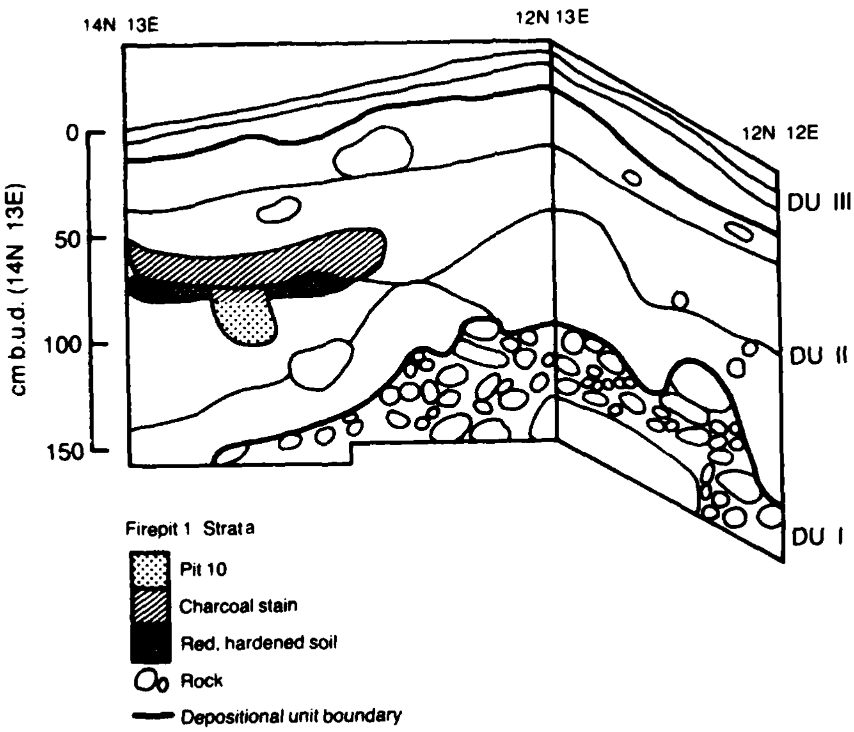

Figure 5-20. Profile of Firepit 1, Zone 22, 45-DO-243.

the large shell concentration in Zone 23 may indicate a more concentrated effort.

A roasting pit with associated bone fragments and lithic debris occurs in Zone 23; a larger pit (possibly a housepit) and a firepit occur in Zone 22. Apart from the fact that pits occur in Zones 23 and 22 and do not occur in Zone 24, the cultural features of 45-DO-243 yield little evidence of any change in site function over time.

SUMMARY

Table 5-7 compares feature types at 45-DO-242 and 45-DO-243. Clearly, the differences between the two sites are more striking than their similarities. At 45-DO-242, a variety of feature types occurs in each zone. At 45-DO-243, only two types are present--pits and shell concentrations--and there are no debris-strewn surfaces, such as we have at 45-DO-242. Similarly, the features of 45-DO-242 are distributed more evenly through time--in three of four analytic zones. Except for the possibly natural shell concentration in Zone 24, features at 45-DO-243 are confined to two analytic zones. Feature analysis, therefore, reveals no evidence of a strong association between the two sites, either functionally or temporally. The possible occurrence of a housepit in Zone 22 (ca. 1500 B.P.) at 45-DO-243 would seem to link it with Zone 13 (3900-3100 B.P.) at 45-DO-242 where three housepits were recorded, but the disparity in radiocarbon dates discredits any postulated relationship.

It appears from feature analysis that sites 45-DO-242 and 45-DO-243 were occupied at different times for different purposes. Despite their proximity, there is no evidence that they were ever part of a single occupation or activity area.

Table 5-7. Frequency of feature types by zone, 45-DO-242 and 45-DO-243.

Feature	45-DO-242					45-DO-243				
	Zone				Total	Zone				Total
	11	12	13	14		21	22	23	24	
Housepit	-	-	3	-	3	-	1?	-	-	1?
Pit	2	-	6	-	8	-	-	1	-	1
Firepit	1	3	3	-	7	-	1	-	-	1
Bone concentration	-	2	3	-	5	-	-	-	-	-
Shell concentration	2	-	-	-	2	-	1	2	1	4
Rock or lithic concentration	1	2	1	-	4	-	-	-	-	-
TOTAL	6	7	16	-	29	-	3	3	1	7

6. SYNTHESIS

Sites 45-DO-242 and 45-DO-243 are separated by a deep draw and comprised of distinct series of cultural strata within similar geologic sequences. No reliable correlations of cultural stratigraphy between the two sites can be made, and so we must consider them separate entities. Each site contains four cultural zones; and one of these at each site is distinguished by a more intensive or long-term occupation. The cultural features and artifact associations at the two sites also indicate a similar range of economic activities over time, although these activities apparently occurred within different socioeconomic contexts.

Zone 24, 45-DO-243, yielded evidence of the sites' earliest occupation--Cascade and Mahkin Shouldered projectile points that suggest a date of at least 5000-4000 B.P. The most intensive occupation at either site occurred in Zone 13, 45-DO-242: here, three large housepits were exposed along with associated living surfaces and features. 45-DO-242 also produced the latest occupation--in Zone 11, where a series of artifact clusters contained small Desert Side-notched projectile points, and a firepit gave a radiocarbon date of 237±80 B.P.

A schematic cross-section of site stratigraphy is presented in Figure 6-1. It may be readily seen that the two sites resemble each other in geologic structure, but differ markedly in cultural stratigraphy. At site 45-DO-242, cultural features cluster along a narrow contour at the base of the abutting terrace slope some distance away from the river. At site 45-DO-243, cultural features are spread out over a larger area, from the rear terrace slope to the river cutbank. The complex packing of features at 45-DO-242 indicates at least three general cultural occupations falling within three analytic zones. The earliest, in Zone 13, is a pit house component with a variety of associated cultural features. The middle occupation, in Zone 12, appears to represent a series of discrete events resulting from brief visits by human groups over a long span of time. The latest occupation, in Zone 11, also appears to represent a series of individual events but these occur over a much shorter interval, and form a connected, definable living surface. At 45-DO-243, occupations in all four analytic zones resemble those recorded for Zone 12 at 45-DO-242--widely separated cultural features evidence sporadic site use over some length of time. We have no evidence, however, that the occupations at the two sites were ever related in any way.

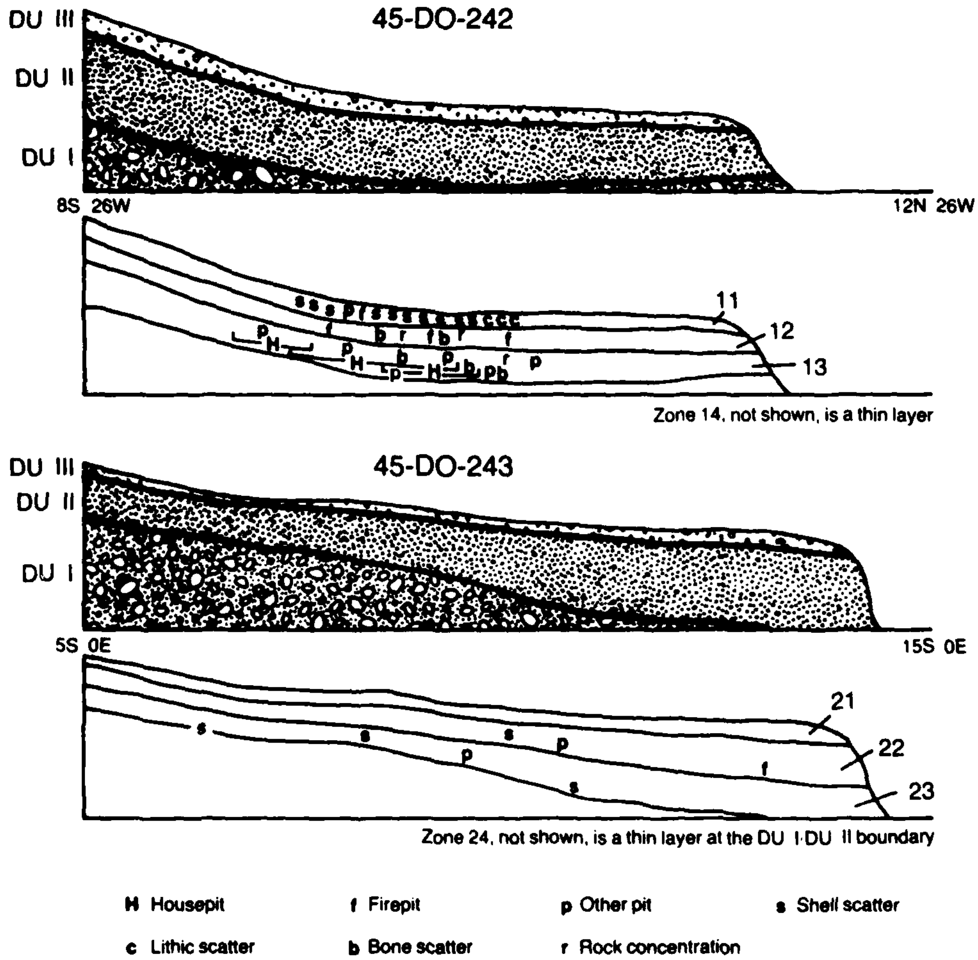

Figure 6-1. Schematic profiles of 45-DO-242 and 45-DO-243.

45-DO-242

Four analytic zones produced cultural material dating from before 4000 B.P. to 200 B.P. The earliest zone yielded the fewest artifacts and no cultural features. The upper zones, however, contained evidence of substantial cultural occupations with high numbers of artifacts and numerous features. Nine radiocarbon dates were obtained from cultural features in these upper three zones.

ZONE 14

This zone is the smallest cultural assemblage, both in artifact count and in excavated volume. Distributions of artifacts were sparse, usually little more than a few stone flakes and bone fragments in a single excavation level. No cultural features were recorded. Except for the absence of some small mammal species, faunal species represented were very similar to those recorded in upper zones. So also were tool types.

ZONE 13

Zone 13 has the largest and most varied cultural assemblage at the site. Concentrations of lithics, bone and shell materials were spread throughout strata 600, 500, 400 and 300, comprising Depositional Unit II. Sixteen cultural features--three pit houses, three firepits, three bone concentrations, a fire-modified rock concentration, and six other pits--document the intensity of prehistoric occupation. The lack of contiguous excavation units precludes any certain determination of stratigraphic association, though many of these features may be contemporaneous. A variety of recovered stone tools reveal that many subsistence-related activities were carried out at the site. The most common tool, the simple utilized flake, exhibits the kind of wear (chipping and smoothing on straight to convex working edges) we should expect if it were used to butcher game. Associated formed tools--projectile points, bifaces, drills, gravers and scrapers--and the numerous recovered bone fragments of deer and mountain sheep document site activities geared to the hunting-butchering-processing of game. The presence of a millingstone on the floor of Housepit 2 may indicate that plant parts were also processed at the site.

Specific activities are preserved in the form of bounded economic features. A large roasting pit, three other cooking pits, and three bone scatters show that deer, mountain sheep and salmon were cooked and eaten at the site. The roasting pit held fragments identified as deer, mountain sheep and salmon. The largest cooking pit (actually a series of at least three pits) yielded many deer bone fragments, some elk and mountain sheep bones, and a miscellany of dog, turtle, marmot and pocket gopher remains. One of the other cooking pits held deer bone. The three bone scatters consisted primarily of deer bone with lesser numbers of mountain sheep fragments. These remains suggest that deer was the usual game animal, though mountain sheep also were taken frequently. Yet the diet of the inhabitants was varied.

Within the large series of cooking pits, excavators recovered an extensive shell concentration in direct association with fire-modified rocks and dog, turtle, marmot and gopher bones. Both shell hinge fragments and fragments of mountain sheep bone were recovered in greater quantities than from any other feature at the sites. Of unique interest are the small mammal and turtle bones mixed with fire-modified rock and heavy charcoal stains, strong evidence that these animals were cooked and eaten. Based on these pits, we have, then, substantial evidence of an intensive human occupation at the site. This is borne out by the range of recovered animal bones as well as by the apparent reuse of the pits during a short time span.

We have evidence as well of a shift in the season of site occupation in the vertical separation of both cultural features and associated food bones. The earlier occupation--represented by three housepits, etc. and the predominantly deer bone assemblage--probably was a winter settlement, or possibly, a year-round settlement of related households. The later occupation--represented by the shallow dwelling, the bone concentration and the cooking pits described above--suggests a spring or summer settlement. The shallow dwelling resembles the summer houses described by Ray (1932) and Spier (1938), while the animal remains recovered from the pits reflect a late winter-spring occupation. Marmot and painted turtles hibernate during the fall and winter, emerging in early spring. Mountain sheep are common at lower elevations along the river only after deep snows have forced them down from higher country to forage. This evidence along with Ray's account (1932) that river mussels were consumed in quantity only during times of hunger, often the early spring after a severe winter, point to later occupations at this site during the spring. The later Zone 13 assemblage may well represent the spring camp of groups of people foraging away from their winter dwellings after the exhaustion of their winter stores.

Zone 13, then, may reflect a shift in the use of the site from a winter village to an early spring camp for small foraging groups. Although cultural features suggest such a shift, it is not evident in the distribution of diagnostic artifact types. Projectile points suggest a rough contemporaneity for all cultural features, although the temporal distribution of both Quilomene Bar Corner-notched and Rabbit Island Stemmed series points is quite broad, ranging over some two thousand years from about 4000-2000 B.P. (cf. Nelson 1969; Lohse 1984). Radiocarbon dates are no more helpful, with only two dates from different floors of Housepit 2 at 3912±459 B.P. and 3066±232 B.P. Still, we can infer that site function shifted over a fairly short period of time, probably after 3500 B.P. and well before 2000 B.P.

ZONE 12

Zone 12 produced a similar but smaller artifact assemblage than that from the lower Zone 13. Restricted to Stratum 200, DU II, this zone yielded eight cultural features: three firepits, two bone concentrations, and two fire-modified rock concentrations. These evidence considerable prehistoric activity, although not on a scale with the postulated winter village in Zone 13. Tools and faunal remains are quite similar to those recovered from other

zones. Again, the simple utilized flake predominates, part of a diversified tool kit of flake tools, formed tools and unformed tools. Tools from this zone, though present in smaller numbers, fall into the same classes described for Zone 13. The notable addition is a hopper-mortar base. The chief economic activity again appears to have been the hunting of game animals like deer, supplemented by the gathering of wild plant stuffs.

This zone lacks housepits or close associations of cultural features indicative of long-term or large-scale occupation. Cultural features appear isolated, suggesting multiple short term activities over a relatively long span of time. Radiocarbon dates cover some 500 years, each associated with a different cultural feature or stratum (914±86 B.P.; 738±67 B.P.; 701±85 B.P.; 556±89 B.P.). The projectile point assemblage is at odds with this radiocarbon range, however, with most point forms characteristic of the Hudnut Phase (ca. 4000-2000 B.P.): Mahkin Shouldered, Nespelem Bar, Rabbit Island A, Columbia Corner-notched. It is apparent that we mixed later and older occupations as Zone 12.

The small number of faunal remains precludes assessment of seasonality of site occupation; open firepits and artifact scatters, however, probably indicate that the site was used during the spring, summer or fall months rather than during the winter.

ZONE 11

Zone 11 is a shallow surface layer incorporating Stratum 100 of DU III. Though smaller than those of either Zone 12 or 13, the artifact assemblage still indicates considerable prehistoric activity. Six cultural features were identified: a firepit, two small pits of unknown function, two shell concentrations, and a lithic concentration. The firepit is associated with the larger shell concentration, and represents a fairly broad, well-defined use area radiocarbon dated at 237±80 B.P. The other shell concentration, which incorporates fire-modified rocks and a few bone fragments, represents a similar activity, though it is much smaller and more diffuse in outline. The lithic concentration probably documents a single occupation of short duration. Composed of ten small Desert Side-notched projectile points, numerous utilized flakes, a few bifaces, a microblade, nearly 200 jasper waste flakes, and other debitage, it evidences manufacture and repair of a fairly extensive tool kit. Several of the projectile points were fragments with breaks through the hafting elements, often snapping the forms through a lateral notch. Such a breakage pattern would more likely occur during manufacture rather than use. The recovery of small, unnotched triangular blanks in the same association supports this interpretation.

Available evidence points to prehistoric use of the site as a camping spot where meals were cooked, game butchered, and tool kits refurbished. We can only speculate as to season of occupation, but the presence of salmon and turtle remains would suggest at least some activity during spring, summer, or fall.

SITE 45-DO-243

Four analytic zones defined for this site indicate a range of prehistoric economic activities similar to those reconstructed for 45-DO-242, despite the absence of dwellings and thick, accumulated living deposits. There are no large cultural features nor are any two features associated, indicating that occupation was primarily of short duration and probably involved small task groups.

ZONE 24

Zone 24 consists of a very small assemblage of artifacts recovered from the sand covering the basal cobble layer at the site, incorporating Stratum 321 and 320, DU I. The only cultural feature was a small, area of shell composed of nine bone fragments and 19 shell hinge fragments. Elsewhere in this zone, artifact associations were diffuse and limited in extent; however, the zone did yield a Cascade B and a large Mahkin Shouldered projectile point, found just above the basal cobble layer. These indicate a prehistoric occupation probably well before the 4000 B.P. date established for 45-DO-242. Because we lack living surfaces, tight artifact associations, and cultural features, we can only speculate about site function during this early period. It does seem likely that any activity was of short duration and involved few people. Given the fact that tools and wear patterns on them document butchering activities, the most plausible scenario is a series of short-term hunting camps.

ZONE 23

Zone 23 contained the highest artifact counts of any zone at the site, and encompasses Stratum 310, 250 and 225 of DU II. The count is inflated, however, by very high numbers of shell fragments. Lithic counts are lower than in the upper Zone 22 assemblage, for instance. Three cultural features were identified. A small pit was exposed in the lower part of the zone, immediately above the boundary with Zone 24. Its margins were vague, marked only by a light charcoal stain, and excavators mixed excavation unit level contents and pit contents. This loose association contained predominantly jasper debitage, together with nine salmon vertebra fragments, two utilized flakes and a single linear flake. The larger shell concentration was a thick accumulation of shell fragments mixed with flecks of charcoal, charcoal stained sand, and general sand matrix. Associated artifacts included two tabular knives, four waste flakes, salmon vertebrae, and an unburned deer mandible. This accumulation probably represents a small midden or refuse pile, the result of periodic visits during the spring and fall. The other shell concentration is very small, and probably represents nothing more than a single meal of shellfish.

In sum, the cultural deposits of Zone 23 are the consequence of more activity than that documented for Zone 24. The small midden of shell and bone debris could mean this was a single spring or fall camp of several weeks or

months, or, possibly, temporary camps returned to several times over a number of years.

ZONE 22

Zone 22 yielded the second largest artifact assemblage and contained the highest number of tools, both formed and unformed. Three cultural features are identified within Stratum 175, 150 and 125 of DU III. One is a concentration of shell covering about one square meter, and containing numerous shell hinges as well as a few stone waste flakes and bone fragments. Unlike those exposed in lower levels, it bore no evidence of fire--neither charcoal staining nor charcoal flecks. The zone did possess a single firepit. Its oxidized and very hard, compacted sand margins suggest it saw repeated use. In profile, it was obvious that a later, narrower firepit, marked by a thin line of charcoal stain, penetrated into the larger defined firepit. This later firepit was probably used only once but does contain a fair amount of tinder. The most striking feature in Zone 22 is the large pit that originates in the lowest part of the zone and penetrates well down into the basal cobble-gravel stratum. At least 90 cm in depth, this feature produced a large quantity of bone fragments and some shell. Among those identified were mountain sheep and deer bone. It may well be a pit house; in any event, it represents considerable labor and an occupation of some duration.

Again, we can only speculate about the season of occupation. The recovered marmot bones evidence some use of the site during the spring and summer. If indeed a pithouse is present, occupation may have extended into the fall and winter as well. Clearly, however, we have nothing like the settlement of households witnessed in Zone 13 at 45-DO-242; rather, evidence indicates use of the site by no more than one household group at most.

ZONE 21

Zone 21 produced a very small artifact assemblage, only a bit larger than that recovered from Zone 24, yet the excavated volume is similar to that removed from Zones 23 and 22. No cultural features were identified. Fire-modified rocks, however, were recovered in numbers comparable to those recovered in the lower part of Zone 22, and may indicate sustained cultural activity. Given site stratigraphy, though, it is likely that some of these rocks, as well as artifacts, actually derive from Zone 22 and were mixed with those of Zone 21 during excavation. Therefore, counts of fire-modified rock and formed and unformed tools probably reflect earlier occupations. Even so, kinds of tools and associated wear patterns evidence activities very much like those observed in lower levels. Butchering and the processing of meat seem to have been the occupants' principal economic tasks. We recovered no plant processing, grinding or pounding tools.

Once more we have little data indicative of the season of occupation--the marmot amd painted turtle remains indicate spring, summer or fall. This, along with the lack of dwellings and sparse scatter of artifacts, would point to occupation in the form of short-term camps.

CHRONOLOGY

Transient human groups first visited these sites sometime in the Kartar Phase (ca. 7000-4000 B.P.), most probably toward the mid- to latter part of that range or in the period from ca. 5000-4000 B.P. These early occupations probably were little more than short-term camps, where meals were eaten, meat and plant parts processed for transport, and tool kits maintained. Later, during the early Hudnut Phase at about 3500 B.P., a winter settlement of several households was established at 45-DO-242. Its occupation could have extended over several years. 45-DO-243 does not appear to have been the scene of a housepit settlement at this time, although we do have meager evidence of a large pit that might represent a dwelling; rather, site activity seems to have been confined largely to short-term camps in the summer and fall. Occupation at 45-DO-243 ends sometime during the transition from the late Hudnut Phase to the early Coyote Creek Phase, or at about 1500 B.P., a date coinciding with the beginning of cultural activities in Zone 12 at 45-DO-242. During this period, housepits were succeeded by more ephemeral, isolated cultural features, suggesting multiple seasonal visits by small groups of people, in the pattern established at 45-DO-243 and postulated for Zone 14 at 45-DO-242. Still later, between about 500-200 B.P., occupation at 45-DO-242 intensified again, and the occupations formed more substantial cultural features preserved as well-defined occupation surfaces. Even so, the evidence points to a seasonal, short-term presence by small groups--perhaps single families or hunting and gathering parties.

The distribution of projectile point types reflects these shifts in site uses. Cascade A and B, Mahkin Shouldered, Nespelem Bar, and a possible Cold Springs Side-notched point mark the earliest sparse occupations. The housepit settlement at 45-DO-242 is characterized by Columbia Corner-notched A and Quilomene Bar Corner-notched projectile points (cf. Leonhardy and Rice 1970; Nelson 1969). The later occupations have Desert Side-notched projectile points. These shifts parallel changes in prehistoric socioeconomic organization postulated for the last five thousand years. Authors have argued that a pit house or village pattern was established on the Columbia Plateau perhaps 3,000 years ago, a period identified as the "Frenchman Springs Phase" (Swanson 1962, Nelson 1969) or the "Tucannon Phase" (Leonhardy and Rice 1970). Pit houses are thought to mark the beginning of a more sedentary subsistence system, possibly concentrated on the exploitation of riverine resources (cf. Nelson 1973). Excavation of Site 45-OK-11 on the Rufus Woods Lake Reservoir has shown that pit houses were built as early as 5000 B.P. on the upper Columbia River (Lohse 1984f), therefore pushing back the development of this purportedly sedentary living pattern. Ames and Marshall (1980) and Ames et al. (1981) also have documented the occurrence of pit houses by ca. 5000 B.P. on the Clearwater River in southwestern Idaho. The transition to, and then from, a village occupation at 45-DO-242 signals a culture change that corresponds to the previously recognized cultural break defined as the "Frenchman Springs Phase" and "Cayuse Phase," but a period of time that can no

longer be considered coeval with the development of sedentary village patterns on the Columbia Plateau.

The inhabitants of the upper Columbia River region apparently utilized several criteria (e.g., exposure to winter sun, access to river resources, nearby supplies of fresh water) in order to select the locations for their winter settlements. In this regard, housepit settlements in the Rufus Woods Lake Reservoir from different cultural periods are seldom superimposed--the single exception being at 45-OK-2 where a large Cayuse Phase village site overlies a smaller collection of housepits dated to the Frenchman Springs Phase. Typically, stratified sites show changes in use over time. Most sites were used as camps, irrespective of cultural period. At certain times, site use shifted to a housepit settlement. The river was a constant focus of activity; some sites by virtue of setting or accessibility proved attractive for occupation. Further, the flexible structure of prehistoric adaptive systems encouraged a shifting pattern of settlement location up and down a narrow corridor of potential optimal locations. Selection of living or activity sites was achieved by weighing alternatives in terms of security and risk compared to ease of access or physical distance.

Sites used for more than one kind of occupation tend to contain a Hudnut Phase housepit settlement. Examples on the Rufus Woods Lake Reservoir include 45-DO-211, 45-OK-258, 45-OK-250/4, and 45-OK-2/2A, as well as 45-DO-242/243. This could be fortuitous, a result of limited sampling, but it could also indicate a much larger prehistoric population during the period 4,000-2,000 years ago. A larger population, with an economy based on a winter village pattern, would have established more sites at more locations up and down the river. This of course assumes a continuity between the settlement-subsistence systems of the prehistoric inhabitants and those recorded for ethnographic groups. The uniformity observed in tool kits and associated economic activities over time would make this a reasonable assumption.

Perhaps what is most remarkable about these sites is the consistency of tool manufacture, tool use and economic activity: they show little if any change over time. While site use does shift dramatically, the range of economic resources and the mode of procurement remain consistent. Variation in site type seems to be a function, rather, of the season of occupation and the use for which the site was selected (cf. Lohse 1984f).

The selection of 45-DO-242 as a winter housepit settlement 3,500 years ago does not appear to be a function of local environmental change. It may well signal increased population densities during the period 4000-2000 B.P., and represent an expansion of an already established village pattern along the river during the height of the Anathermal period of cooler and wetter conditions (cf. Antevs 1948, 1955; Hansen 1947; Nickman and Leopold 1981). Its abandonment as a housepit settlement may likewise signal a dissolution of that village pattern in later periods as a consequence of warmer and drier climatic conditions and/or lower population densities. However we interpret these changes in site use, we cannot attribute them to any revolutions in the prehistoric economic system, for this shows remarkably little variation over at least the last 5,000 years of aboriginal occupation of the upper Columbia River contained within the Rufus Woods Lake Reservoir. For a more detailed

description of the nature of the archaeological record in the project area, in particular, choices of site location and comparisons of assemblages from housepit settlements over the three defined cultural phases, and discussion of suggested mechanisms for this perceived pattern of aboriginal adaptation, refer to the summary chapter presented with the 45-OK-11 site report (Lohse 1984f) and the project summary volume (Jaehnig and Campbell 1984).

REFERENCES

Ahler, S.A.
1970 Projectile point form and function at Rodgers Shelter, Missouri. **Missouri Archaeological Society, Research Series** 8.

Antevs, E.
1948 Climatic changes and pre-shite man. In, The Great Basin with emphsis on glacial and postglacial times. **University of Utah Bulletin** 38, Biological Series 10:168-191.

Benfer, R.A.
1967 A design for the study of archaeological characteristics. **American Anthropologist** 69:719-730.

Butler, B.R.
1961 The Old Cordilleran culture in the Pacific Northwest. **Idaho State College Museum, Occasional Papers** 5.

1961 The Old Cordilleran culture in the Pacific Northwest. **Idaho State College Museum, Occasional Papers** 5.

Campbell, S.K.
1984a **Archaeological investigations at nonhabitation sites, Chief Joseph Dam Project, Washington.** Office of Public Archaeology, University of Washington, Seattle.

1984b **Archaeological investigations at Sites 45-OK-2 and 45-OK-2A, Chief Joseph Dam Project, Washington.** Office of Public Archaeology, University of Washington, Seattle.

Campbell, S.K., editor
1984c **Report of burial relocation projects, Chief Joseph Dam Project, Washington.** Office of Public Archaeology, University of Washington, Seattle.

1984d **Research Design for the Chief Joseph Dam Cultural Resources Project.** Office of Public Archaeology, University of Washington, Seattle.

Chance, D.H., J.V. Chance, and J.L. Fagan
1977 Kettle Falls: 1972. **University of Idaho, Anthropological Research Manuscript Series** 31.

Collier, D., A.E. Hudson, and A. Ford
1942 Archaeology of the upper Columbia region. **University of Washington, Publications in Anthropology** 9(1).

Crabtree, D.E.
1967 The flintknapper's raw materials. **Tebiwa** 10:8-24

Crabtree, D.E.
1972 An introduction to flintworking. **Idaho State University Museum, Occasional Papers** 28.

Crabtree, D.E.
1973 The obtuse angle as a functional edge. **Tebiwa** 16:46-53.

Cressman, L.S., D.L. Cole, W.A. Davis, T.M. Newman, and D.J. Scheans
1960 Cultural sequence at The Dalles, Oregon: a contribution to Pacific Northwest prehistory. **American Philosophical Society, Transactions** 50(10).

Dalquest, W.W.
1941 Distribution of cottontail rabbits in Washington State. **Journal of Wildlife Management** 5:408-411.

1948 Mammals of Washington. **University of Kansas Museum of Natural History, Publications** 2.

Damon, P.E., C.W. Ferguson, A. Long, and E.I. Wallick
1974 Dendrochronological calibration of the radiocarbon time scale. **American Antiquity** 39:350-366.

Daubenmire, R.F.
1970 Steppe vegetation of Washington. **Washington State University, Washington Agricultural Experiment Station, Technical Bulletin** 62.

Dunnell, R.C.
1971 **Systematics in prehistory.** Free Press, New York.

1979 Archaeological potential of anthropological and scientific models of function. In **Essays in honor of Irving B. Rouse**, edited by R.C. Dunnell and E.S. Hall, Jr., pp. 41-73. Mouton, The Hague.

Ernst, C.H., and R.W. Barbour
1972 **Turtles of the United States.** University of Kentucky Press, Lexington.

Flenniken, J., and E. Garrison
1975 Thermally altered novaculite and stone tool manufacturing techniques. **Journal of Field Archaeology** 2:125-131.

Franklin, J.F., and C.T. Dyrness
1973 Natural vegetation of Oregon and Washington. **U.S. Department of Agriculture, Forest Service, General Technical Report** PNW-8.

Frison, G.C.
1968 A functional analysis of certain chipped stone tools. **American Antiquity** 33:149-155.

Grayson, D.K.
1982 The paleontology of Gatecliff Shelter small mammals. In The archaeology of Gatecliff Shelter and Monitor Valley, by D.H. Thomas. **American Museum of Natural History Anthroplogical Papers**, in press.

Greengo, R.E.
1982 Studies in prehistory, Priest Rapids and Wanapum Reservoir areas, Columbia River, Washington. Report to U.S. Department of Interios, National Park Ser\.ce, San Francisco. University of Washington, Department of Anthropology.

Gustafson, C.E.
1972 ***Vertebrate faunal* remains from the Marmes rockshelter and related archaeolgical sites in the Columbia Basin.** Ph.D. dissertation, Washington State University. University Microfilms, Ann Arbor.

Hayden, B. (editor)
1979 **Lithic use-wear analysis.** Academic Press, New York.

Holmer, R.N.
1978 **A matematical typology for archaic projectile points of the Eastern Great Basin.** Unpublished Ph.D. dissertation, Department of Anthropology, University of Utah.

Ingles, L.G.
1965 **Mammals of the Pacific states.** Stanford University Press, Stanford.

Jaehnig, M.E.W.
1981 **Field operations at the Chief Joseph Project: aspects of organization and some preliminary results.** Paper presented at the 34th Annual Northwest Anthropological Conference, Portland.

1981 **The Mount Tolman Archaeological Project, Colville Indian Reservation: technical report no. 11.** Bureau of Indian Affairs, History/Archaeology Department, Colville Confederated Tribes, Nespelem, Washington.

1983a Archaeological investigations at Site 45-OK-258, Chief Joseph Dam Reservoir, Washington. Ms. on file, U.S. Army Corps of Engineers, Seattle District.

1983b **Chief Joseph Dam Cultural Resources Project: preliminary report of field investigations, 1978-1980.** Office of Public Archaeology, University of Washington, Seattle.

1984a **Archaeological investigations at Site 45-DO-273, Chief Joseph Dam Project.** Office of Public Archaeology, University of Washington, Seattle.

1984b **Archaeological investigations at Site 45-OK-18, Chief Joseph Dam Project, Washington.** Office of Public Archaeology University of Washington, Seattle.

Jaehnig, M.E.W. and S.K. Campbell (editors)
1984 **Summary of results, Chief Joseph Dam Cultural Resources Project.** Office of Public Archaeology, University of Washington, Seattle.

Jermann, J.V., T.H. Lorenz, and R.S. Thomas
1977 Continued archaeological testing at the Duwamish No. 1 Site (45KI23). **University of Washington, Office of Public Archaeology, Reconnaissance Reports** 11.

Johnson, R.J.
1978 **Multivariate statistical analysis in geography.** London: Longwan Group Limited.

Keeley, L.
1974 Technique and methodology in microwear studies: a critical review. **World Archaeology** 5:323-336.

Klecka, W.R.
1980 **Discriminant analysis.** Sage Publications, Inc. Beverly Hills.

Keeley, L.
1978 Microwear polishes on flint: some experimental results. In Lithics and subsistence: the analysis of stone tool use in prehistoric economies, edited by D. Davis. **Vanderbilt University Publications in Anthropology** 20.

Lawrence, B.
1968 Antiquity of large dogs in North America. **Tebiwa** 11(2):43-49.

Leonhardy, F.C.

1968 An opinion on archaeological interpretation in the Plateau. In Archaic prehistory in the Western United States, edited by C. Irwin-Williams. **Eastern New Mexico University Contributions in Anthropology** 1(3):27-31.

Leonhardy, F.C. and G.R. Muto

1972 **The Levallois technique on the Lower Snake River.** Paper presented at the 1972 Northwest Anthropological Conference, Portland.

Leonhardy, F.C., and D.G. Rice

1970 A proposed culture typology for the lower Snake River region, southeastern Washington. **Northwest Anthropological Research Notes** 4(1):1-29.

Leonhardy, F.C., G. Schroedl, J.Bense, and S. Beckerman

1971 Wexpúsnime (45GA61): preliminary report. Report to the National Park Service. **Washington State University, Laboratory of Anthropology, Reports of Investigations** No. 49.

Lohse, E.S.

1984a **Archaeological investigations at site 45-DO-204, Chief Joseph Dam Reservoir, Washington.** Office of Public Archaeology, University of Washington, Seattle.

1984b **Archaeological investigations at Site 45-DO-211, Chief Joseph Dam Reservoir, Washington.** Office of Public Archaeology, University of Washington, Seattle.

1984c **Archaeological investigations at Site 45-DO-242/243, Chief Joseph Dam Reservoir, Washington.** Office of Public Archaeology, University of Washington, Seattle.

1984d **Archaeological investigations at Site 45-DO-282, Chief Joseph Dam Reservoir, Washington.** Office of Public Archaeology, University of Washington, Seattle.

1984e **Archaeological investigations at Site 45-DO-326, Chief Joseph Dam Reservoir, Washington.** Office of Public Archaeology, University of Washington, Seattle.

1984f **Archaeological investigations at Site 45-OK-11, Chief Joseph Dam Reservoir, Washington.** Office of Public Archaeology, University of Washington, Seattle.

1984g Rufus Woods Lake Projectile Point Chronology. In **Summary of results, Chief Joseph Dam Cultural Resources Project,** edited by M.E.W. Jaehnig and S.K. Campbell. Office of Public Archaeology, University of Washington, Seattle.

Lyman, R.L.

1975 Rufus Woods Lake Archaeological Salvage. Ms. on file, Chief Joseph Dam Cultural Resources Project.

1981 **Archaeofaunal analysis in the Chief Joseph Project area.** Paper presented at tge 34th Annual Northwest Anthropological Conference, Portland.

Manville, R.H.

1980 The origin and relationship of American wild sheep. In **The desert bighorn: its life history, ecology and management,** edited by G. Monson and L. Sumner, pp. 1-6. University of Arizona Press, Tucson.

Maser, C., and R.M. Storm

1970 **A Key to the Microtinae of the Pacific Northwest.** Corvallis, Oregon State University Book Stores.

Miss, C.J.

1984a **Archaeological investigations at Site 45-DO-214, Chief Joseph Dam Reservoir, Washington.** Office of Public Archaeology, University of Washington, Seattle.

1984b **Archaeological investigations at Site 45-DO-285, Chief Joseph Dam Reservoir, Washington.** Office of Public Archaeology, University of Washington, Seattle.

1984c **Archaeological investigations at Site 45-OK-250/4, Chief Joseph Dam Reservoir, Washington.** Office of Public Archaeology, University of Washington, Seattle.

1984d **Archaeological investigations at Site 45-OK-287/288, Chief Joseph Dam Reservoir, Washington.** Office of Public Archaeology, University of Washington, Seattle.

Muto, G.R.

1971 **A technological analysis of the early stages in the manufacture of lithic artifacts.** Unpublished M.A. thesis, Department of Anthropology, Idaho State University.

Muto, G.R.

1976 The Cascade technique: an examination of a Levallois-like reduction system in early Snake River prehistory. Unpublished Ph.D. dissertation, Department of Anthropology, Washington State University.

Nelson, C.M.
1969 The Sunset Creek site (45-KT-28) and its place in Plateau prehistory. **Washington State Universtiy, Laboratory of Anthropology, Reports of Investigations** 47.

1973 Prehistoric culture change in the Intermontane Plateau of western North America. In **The explanation of culture change**, edited by C. Renfrew, pp. 371-390. Duckworth, London.

Nickmann, R.J., and E. Leopold
1981 A postglacial pollen record from Goose Lake, Okanogan County, Washington: evidence for an early Holocene cooling. Ms. on file, University of Washington, Office of Public Archaeology.

Nie, N.H., C.H. Hull, J.G. Jenkins, K. Steinbrenner, and D.H. Bent
1975 **SPSS: statistical package for the social sciences** (second ed.). Mcgraw-Hill, New York.

Odell, G.H.
1977 **The application of micro-wear analysis to the lithic component of an entire prehistoric settlement: methods, problems and functional reconstructions.** Unpublished Ph.D. dissertation, Department of Anthropology, Harvard University.

Osborne, H.D.
1953 Archaeological occurrence of pronghorn antelope, bison and horse in the Columbia Plateau. **Science Monthly** 77:260-269.

Piper, C.
1906 Flora of the state of Washington. In **Contributions to the U.S. National Herbarium** (Vol. 11). U.S. Government Printing Office, Washington, D.C.

Post, R.H.
1938 The subsistence quest. In The Sinkaletk or Southern Okanogan of Washington, edited by L. Spier, pp. 9-34. **George Banta, General Series in Anthropology** 6.

Ray, V.F.
1932 The Sanpoil and Nespelem: Salishan peoples of northeast Washington. **University of Washington, Publications in Anthropology** 5.

Rice, D.G.
1969 Preliminary report, Marmes Rockshelter Archaeological site, Southern Columbia Plateau. Report submitted to the National Park Service, Pullman.

Robinette, W.L., D.A. Jones, G. Rogers, and J.S. Gashwiler
1957 Notes on tooth development and wear for Rocky Mountain mule deer. **Journal of Wildlife Management** 21(2):134-153.

Sanger, D.
1968 Prepared core and blade traditions in the Pacific Northwest. **Arctic Anthropology** 5:92-120.

1969 Cultural traditions in the interior of British Columbia. **Syesis** 2:189-200.

1970 Midlatitude core and blade traditions. **Arctic Anthropology** 7:106-114.

Semenov, S.A.
1964 **Prehistoric technology: an experimental study of the oldest tools and artifacts from traces of manufacture and wear** (translated by M.W. Thompson). Cory, Adams & Mackay, London.

Severinghause, C.W.
1949 Tooth development and wear as criteria of age in white-tailed deer. **Journal of Wildlife Management** 13:195-216.

Smith, L., and A. Goodyear
1976 The statistical discrimination of hard and soft percussors. Ms. in hands of authors.

Southard, Michael D.
1973 A study of two northwest housepit populations. **Northwest Anthropological Research Notes** 7(1):61-83.

Speth, J.
1972 Mechanical basis of percussion flaking. **American Antiquity** 37:34-60.

Spinden, H.
1908 The Nez Perce Indians. **American Anthropological Association, Memoirs** 2:167-274.

Stafford, B.D.
1977 Burin manufacture and utilization; an experimental study. **Journal of Field Archaeology** 4:235-246.

Stafford, B.D., and C.R. Stafford
1979 **A comparison of macro- and microwear functional analyses of lithics.** Paper presented at the 44th Annual Meeting of the Society for American Archaeology, Vancouver, B.C.

Stebbins, R.C.
1966 **A field guide to western reptiles and amphibians.** Houghton Mifflin, Boston.

Swanson, E.H., Jr.
1962 The emergence of Plateau Culture. **Idaho State College Museum, Occasional Papers** 8.

Swanson, E.H., Jr. (editor)
1975 **Lithic technology, making and using stone tools.** Mouton, The Hague.

Teit, J.
1930 The Salishan tribes of the western Plateau. **Bureau of American Ethnology, Annual Report** 45:25-396.

Wilmsen, E.N.
1968 Functional analysis of flaked stone artifacts. **American Antiquity** 33:156-161.

1970 Lithic analysis and cultural inference: a paleo-Indian case. **University of Arizona, Anthropological Papers** 16.

APPENDIX A:

RADIOCARBON DATE SAMPLES AND RESULTS OF SOIL ANALYSES, 45-DO-242 AND 45-DO-243.

Table A-1. Radiocarbon date samples, 45-DO-242.

Lab Sample #[1]	Zone	DU	Stratum	Unit	Level	Feature #	Material/gms	Radiocarbon Age (years B.P.) T1/2=5730	Dendrocorrected Age[2] (years B.P.)
TX-3131	12	-	-	T.P. 2	20A	-	Charcoal/8.7	752± 60	738± 67
TX-4172	11	III	100	4N26W	20+	3	Charcoal/7	230± 80	237± 80
	Shell scatter, contains Firepit 1-A (F30).								
TX-4173	12	II	200	0N7W	50+	4	Charcoal/25	690± 80	701± 85
	Widely distributed cultural stratum.								
TX-4174	13	II	500	1S27W	160	23	Charcoal/8	3510±440	3912±459
	Housepit 2 floor.								
TX-4175	12	II	200	4N34W	20	-	Charcoal/6.9	920± 80	914± 86
TX-4176	13	II	500	2N27W	180	23	Charcoal/5.4	2860±230	3066±232
	Housepit 2 floor;at least two floors are visible in profile.								
TX-4177	11	III	100	4N5W	60	4	Charcoal/7.8	330± 70	340± 70
	Horizontally extensive.								
TX-4178	12	II	200	4N5W	100	31	Charcoal/30	540± 80	556± 89
	Firepit 2-C.								

1 TX samples were dated by University of Texas-Austin, Radiocarbon Laboratory.
2 Dendrocorrected after Damon et al. (1974)

Table A-2. Radiocarbon date samples, 45-DO-243.

Lab Sample #[1]	Zone	DU	Stratum	Unit	Level	Feature #	Material/gms	Radiocarbon Age (ears B.P.)	Dendrocorrected Age[2] (Years B.P.)
TX-4034	22	III	175	3N42W	30	-	Partially carbonized wood/15	1530±60	1512±64

1 TX samples were dated by University of Texas-Austin, Radiocarbon Laboratory.
2 Dendrocorrected after Damon et al. (1974).

Table A-3. Results of physical and chemical soil analyses, Column 2, 45-DO-242.

Sample No.	cm Below Surface	Physical Analyses: Munsell Color (dry)	Physical Analyses: Particle Size: Sand/Silt/Clay (%)	Physical Analyses: Constituents: Charcoal (%)	Constituents: Ash[1] (%)	Constituents: Bone (%)	Constituents: Shell (%)	Constituents: Organic Matter (%)	Constituents: Minerals (%)	Constituents: Grain Rounding[2]	Chemical Analyses: pH	Chemical Analyses: Organic Matter (%)	Chemical Analyses: Exchangeable Calcium (ppm)	Chemical Analyses: Phosphate (ppm)
1	7- 11	10YR(6/3)	68/25/ 7	-	-	-	-	2	98	1-2	7.70	NA[3]	1288	51.8
2	15- 18	10YR(6/3)	69/22/ 9	-	-	-	-	2	98	1-2	7.60	NA	1225	60.9
3	21- 28	10YR(6/3)	78/15/ 7	-	-	-	-	1	99	2-4	7.50	NA	1540	64.4
4	31- 41	10YR(5/3)	70/23/ 7	1	-	-	-	1	98	2-4	7.20	NA	1225	57.1
5	42- 50	10YR(6/4)	76/15/ 9	Trace	-	-	-	1	98+	2-4	6.90	NA	1288	54.6
6	55- 65	10YR(5/4)	75/18/ 7	1	-	-	-	1	98	2-3	6.80	NA	901	62.0
7	65- 70	10YR(6/4)	80/11/ 9	Trace	-	-	-	Trace	99+	2-3	6.80	NA	1435	54.6
8	77- 87	10YR(6/4)	80/14/ 6	Trace	-	-	-	Trace	99+	2-3	6.80	NA	1288	49.4
9	87- 96	10YR(6/4)	75/18/ 7	Trace	-	-	-	-	99+	2-4	6.80	NA	1897	54.6
10	96-105	10YR(6/4)	76/18/ 6	-	-	-	-	-	100	2-3	6.80	NA	1288	56.0
11	112-122	10YR(6/4)	76/16/ 8	-	-	-	-	-	100	2-3	6.80	NA	941	60.9
12	122-132	10YR(6/4)	86/13/ 1	-	-	-	-	-	100	2-3	7.50	NA	901	52.5
13	132-140	10YR(6/4)	86/11/ 3	-	-	-	-	-	100	2-3	7.70	NA	567	52.5
14	150-160	10YR(6/6)	85/13/ 2	-	-	-	-	-	100	2-3	7.70	NA	1033	46.9
15	160-170	10YR(6/6)	88/11/ 1	-	-	-	-	-	100	2-3	7.70	NA	1033	46.2
16	170-180	10YR(6/4)	90/10/ 0	-	-	-	-	-	100	2-3	7.70	NA	808	46.9
17	180-185	10YR(5/6)	90/10/ 0	-	-	-	-	-	100	3-4	7.50	NA	361	41.3
18	186-195	10YR(6/4)	98/ 2/ 0	-	-	-	-	-	100	3-4	7.60	NA	1540	43.1
19	200-207	10YR(6/3)	99/ 1/ 0	-	-	-	-	-	100	3-4	7.50	NA	-	34.3

1 Mazama Ash
2 1=angular, 2=sub-angular, 3=rounded, 4=sub-rounded.
3 Not analyzed for this column.

Table A-4. Results of physical and chemical soil analyses, Column 4, 45-DO-242.

Sample No.	cm Below Surface	Physical Analyses: Munsell Color (dry)	Particle Size: Sand/Silt/Clay (%)	Constituents: Charcoal (%)	Ash[1] (%)	Bone (%)	Shell (%)	Organic Matter (%)	Minerals (%)	Grain Rounding[2]	Chemical Analyses: pH	Organic Matter (%)	Exchangeable Calcium (ppm)	Phosphate (ppm)
1	0- 5	10YR(5/4)	76/24/ 0	-	-	-	-	20	80	1-4	6.40	NA[3]	1033	57.6
2	7- 17	10YR(5/3)	75/25/ 0	Trace	-	-	-	10	89+	2-4	6.30	NA	-	60.9
3	19- 29	10YR(5/3)	80/20/ 0	Trace	-	-	-	5	94+	2-3	7.20	NA	-	57.4
4	29- 39	10YR(6/3)	83/17/ 0	3	-	-	-	2	95	1-2	7.10	NA	1646	55.3
5	40- 50	10YR(5/4)	80/19/ 1	2	-	-	-	Trace	97+	2-4	6.80	NA	901	60.9
6	50- 60	10YR(5/4)	84/16/ 0	2	-	-	-	Trace	97+	2-3	6.70	NA	-	60.8
7	60- 70	10YR(6/4)	84/16/ 0	1	-	-	-	Trace	98+	1-4	6.50	NA	-	56.0
8	72- 82	10YR(6/4)	85/15/ 0	-	-	-	-	-	100	1-4	6.60	NA	587	64.1
9	82- 92	10YR(6/4)	86/14/ 0	-	-	-	-	-	100	1-4	6.60	NA	567	62.0
10	92-102	10YR(5/3)	85/15/ 0	Trace	-	-	-	-	99+	1-4	6.50	NA	-	56.7
11	110-120	10YR(5/3)	89/10/ 1	Trace	-	-	-	-	99+	2-3	6.50	NA	756	59.1
12	120-130	10YR(5/4)	89/11/ 0	1	-	-	-	Trace	98+	2-3	6.80	NA	1477	63.0
13	136-146	10YR(5/6)	90/10/ 0	-	-	-	-	-	100	4-3	6.80	NA	643	69.0
14	150-160	10YR(6/4)	98/ 2/ 0	Trace	-	-	-	-	99+	4-3	6.70	NA	-	61.1

1 Macame Ash
2 1=angular, 2=sub-angular, 3=rounded, 4=sub-rounded.
3 Not analyzed for this column.

Table A-5. Results of physical and chemical soil analyses, Column 1, 45-DO-243.

Sample No.	cm Below Surface	Physical Analyses: Munsell Color (dry)	Particle Size: Sand/Silt/Clay (%)	Constituents: Charcoal (%)	Ash[1] (%)	Bone (%)	Shell (%)	Organic Matter (%)	Minerals (%)	Grain Rounding[2]	Chemical Analyses: pH	Organic Matter (%)	Exchangeable Calcium (ppm)	Phosphate (ppm)
1	+10- 0	10YR(5/4)	85?15/ 0	-	-	-	-	2	98	1	6.10	NA[3]	1288	57.4
2	0- 10	10YR(5/4)	86/14/ 0	Trace	-	-	-	5	94+	1-2	6.20	NA	614	57.4
3	10- 20	10YR(5/4)	84/16/ 0	-	-	-	-	3	97	1-2	6.30	NA	614	55.0
4	20- 28	10YR(5/4)	88/12/ 0	-	-	-	-	7	93	1-2	6.40	NA	614	51.5
5	30- 40	10YR(6/4)	70/25/ 5	-	-	-	-	2	98	1	6.60	NA	980	57.4
6	40- 50	10YR(6/5)	85/15/ 0	-	-	-	-	1	99	1-2	6.60	NA	299	56.7
7	50- 60	10YR(6/5)	86/14/ 0	-	-	-	-	Trace	99+	1-2	6.50	NA	756	55.0
8	62- 70	10YR(6/4)	85/15/ 0	-	-	-	-	Trace	99+	1-2	6.60	NA	260	60.9
9	70- 80	10YR(6/5)	83/17/ 0	-	-	-	-	Trace	99+	1	6.60	NA	86	53.0
10	80- 90	10YR(7/4)	76/24/ 0	-	-	-	-	Trace	99+	1-2	6.60	NA	473	58.5
11	90-100	10YR(6/4)	84/16/ 0	-	-	-	-	Trace	99+	1-4	6.80	NA	756	53.6
12	100-109	10YR(6/3)	78/21/ 1	-	-	-	-	Trace	99+	1-4	6.80	NA	299	57.4
13	110-120	10YR(6/3)	73/25/ 2	-	-	-	-	Trace	99+	1-4	6.60	NA	-	55.0
14	120-130	10YR(6/4)	72/24/ 4	-	-	-	-	-	100	2-4	6.60	NA	706	51.5
15	134-138	10YR(6/3)	76/21/ 3	-	-	-	-	Trace	99+	4	6.70	NA	567	56.4
16	138-148	10YR(6/3-6/4)	75/21/ 4	-	-	-	-	-	100	1-4	6.80	NA	1372	48.3
17	150-158	10YR(6/3-6/4)	75/23/ 2	-	-	-	-	-	100	2-4	7.00	NA	142	52.9
18	158-162	10YR(6/3)	76/21/ 3	-	-	-	-	Trace	99+	1-4	7.10	NA	361	50.8
19	162-170	10YR(6/3)	75/24/ 1	-	-	-	-	-	100	1-4	7.30	NA	1435	51.5
20	170-180	10YR(6/3)	78/20/ 2	-	-	-	Trace	-	99+	2-4	7.50	NA	1225	52.2
21	180-190	10YR(6/3)	78/21/ 1	-	-	-	Trace	-	99+	2-4	7.60	NA	1750	56.7
22	190-200	10YR(6/3)	71/28/ 1	-	-	-	-	-	100	1-4	7.50	NA	1372	52.2
23	204-210	10YR(6/4)	80/15/ 5	-	-	-	-	Trace	99+	2-4	7.10	NA	980	53.6
24	210-220	10YR(6/3-6/4)	78/17/ 5	-	-	-	-	-	100	2-3	6.80	NA	1177	51.5

1 Mazama Ash
2 1=angular, 2=sub-angular, 3=rounded, 4=sub-rounded.
3 Not analyzed for this column.

Table A-6. Results of physical and chemical soil analyses, Column 2, 45-DO-243.

Sample No.	cm Below Surface	Physical Analyses: Munsell Color (dry)	Particle Size: Sand/Silt/Clay (%)	Constituents: Charcoal (%)	Ash[1] (%)	Bone (%)	Shell (%)	Organic Matter (%)	Minerals (%)	Grain Rounding[2]	Chemical Analyses: pH	Organic Matter (%)	Exchangeable Calcium (ppm)	Phosphate (ppm)
1	+ 2- 2	10YR(5/3)	65/28/ 7	3	-	Trace	-	15	81+	1-2	8.00	2	1400	48.2
2	2- 10	10YR(4/3)	73/17/10	2	-	-	-	10	88	1-4	8.20	Trace	630	35.7
3	12- 20	10YR(6/3)	70/23/ 7	1	-	-	1	5	94	1	8.40	-	1505	35.7
4	20- 28	10YR(6/3)	58/20/22	Trace	-	-	Trace	2	97+	1-2	8.40	-	1645	30.1
5	30- 40	10YR(6/3.5)	68/22/10	-	-	-	Trace	Trace	99+	1	8.50	-	1400	52.5
6	40- 50	10YR(6/3.5)	65/23/12	2	-	Trace	1	Trace	98+	1-2	8.40	-	1540	53.9
7	50- 54	10YR(6/3.5)	63/25/12	3	-	Trace	Trace	1	95+	1-2	8.40	-	830	54.6
8	58- 60	10YR(6/3.5)	68/20/12	3	-	Trace	3	Trace	93+	1-2	8.60	-	2880	54.6
9	60- 70	10YR(6/3.5)	68/20/12	1	-	Trace	2	Trace	96+	1-2	8.70	-	2380	49.0
10	70- 80	10YR(6/3.5)	78/15/ 7	Trace	-	Trace	1	Trace	99+	1-4	8.80	-	1820	49.0
11	80- 86	10YR(6/3.5)	75/23/ 2	Trace	-	Trace	1	Trace	98+	1-4	8.80	-	1610	61.6
12	86-100	10YR(6/3)	83/17/ 0	Trace	-	-	1	-	99+	1-4	9.00	-	2380	53.9
13	100-110	10YR(6/3)	83/17/ 0	-	-	-	2	-	98	1-4	9.00	-	805	48.3
14	110-120	10YR(6/3)	83/17/ 0	-	-	-	Trace	-	99+	1-4	9.10	-	665	58.8
15	120-130	10YR(7/2.5)	88/12/ 0	-	-	-	Trace	-	99+	3-4	9.40	-	685	56.5
16	130-140	10YR(7/2.5)	83/15/ 2	-	-	-	Trace	-	99+	3-4	9.40	-	1060	51.8
17	140-150	10YR(7/2.5)	85/13/ 2	-	-	-	Trace	-	99+	3-4	9.60	-	1190	49.7
18	160-170	10YR(7/2)	90/10/ 0	-	-	-	-	-	100	3-4	9.70	-	2240	43.4
19	170-174	10YR(7/2)	88/10/ 2	-	-	-	-	-	100	1-4	9.80	-	1540	39.2
20	178-182	Salt/pepper	93/ 5/ 2	-	-	-	-	-	100	3-4	9.90	-	385	31.5

[1] Hexane Ash
[2] 1=angular, 2=sub-angular, 3=rounded, 4=sub-rounded.

Table A-7. Results of physical and chemical soil analyses, Column 3, 45-DO-243.

Sample No.	cm Below Surface	Physical Analyses: Munsell Color (dry)	Particle Size: Sand/Silt/Clay (%)	Constituents: Charcoal (%)	Ash[1] (%)	Bone (%)	Shell (%)	Organic Matter (%)	Minerals (%)	Grain Rounding[2]	Chemical Analyses: pH	Organic Matter (%)	Exchangeable Calcium (ppm)	Phosphate (ppm)
1	+4- +2	10YR(5/3)	73/27/ 0	-	-	-	-	25	75	1-4	6.70	NA[3]	280	58.4
2	0- 4	10YR(5/3-5/4)	78/22/ 0	-	-	-	-	8	92	1-4	7.20	NA	756	57.4
3	10- 20	10YR(5/3-5/4)	78/20/ 2	Trace	-	-	-	6	93+	2-4	7.40	NA	756	54.9
4	24- 30	10YR(5/3)	80/20/ 0	-	-	-	-	2	98	2-4	7.20	NA	1225	57.4
5	30- 40	10YR(5/3-5/4)	81/18/ 1	-	-	-	-	1	99	1-4	7.20	NA	1093	57.0
6	40- 44	10YR(6/4)	79/20/ 1	-	-	-	-	1	99	1-4	7.20	NA	980	54.5
7	48- 54	10YR(6/4)	84/15/ 1	-	-	-	-	Trace	99+	1-2	7.00	NA	1645	59.8
8	60- 70	10YR(6/4)	79/19/ 2	-	-	-	-	-	100	1-2	7.20	NA	1929	58.8
9	70- 74	10YR(6/3)	75/20/ 5	-	-	-	-	-	100	1-4	7.10	NA	2590	56.8
10	80- 90	10YR(6/3)	76/24/ 0	-	-	-	-	Trace	99+	1-4	7.30	NA	1960	57.0
11	90-100	10YR(6/3-6/4)	79/20/ 1	-	-	-	-	-	100	2-4	7.40	NA	1834	57.4
12	100-110	10YR(6/4)	80/20/ 0	-	-	-	-	Trace	99+	2-4	7.40	NA	1477	56.0
13	120-130	10YR(6/4)	83/17/ 0	-	-	-	-	-	100	2-4	7.40	NA	3010	58.5
14	130-140	10YR(6/4)	79/19/ 2	-	-	-	Trace	-	99+	2-4	7.50	NA	3073	58.1
15	140-150	10YR(6/4)	81/18/ 1	-	-	-	Trace	-	00+	2-4	7.50	NA	3062	59.2
16	150-160	10YR(6/4)	80/19/ 1	-	-	-	Trace	-	99+	2-4	7.50	NA	3010	53.6
17	170-180	10YR(6/4)	86/14/ 0	-	-	-	-	-	100	2-4	7.60	NA	2779	47.0
18	180-200	10YR(6/4)	93/ 7/ 0	-	-	-	-	-	100	2-3	7.50	NA	1372	48.0
19	200-210	10YR(6/4)	91/ 8/ 1	-	-	-	-	-	100	2-3	7.50	NA	1980	45.5
20	210-220	10YR(6/4)	93/ 7/ 0	-	-	-	-	-	100	2-3	7.60	NA	189	42.0

1 Hexane Ash
2 1=angular, 2=sub-angular, 3=rounded, 4=sub-rounded.
3 Not analyzed for this column.

APPENDIX B:

ARTIFACT ASSEMBLAGE, 45-DO-242 AND 45-DO-243

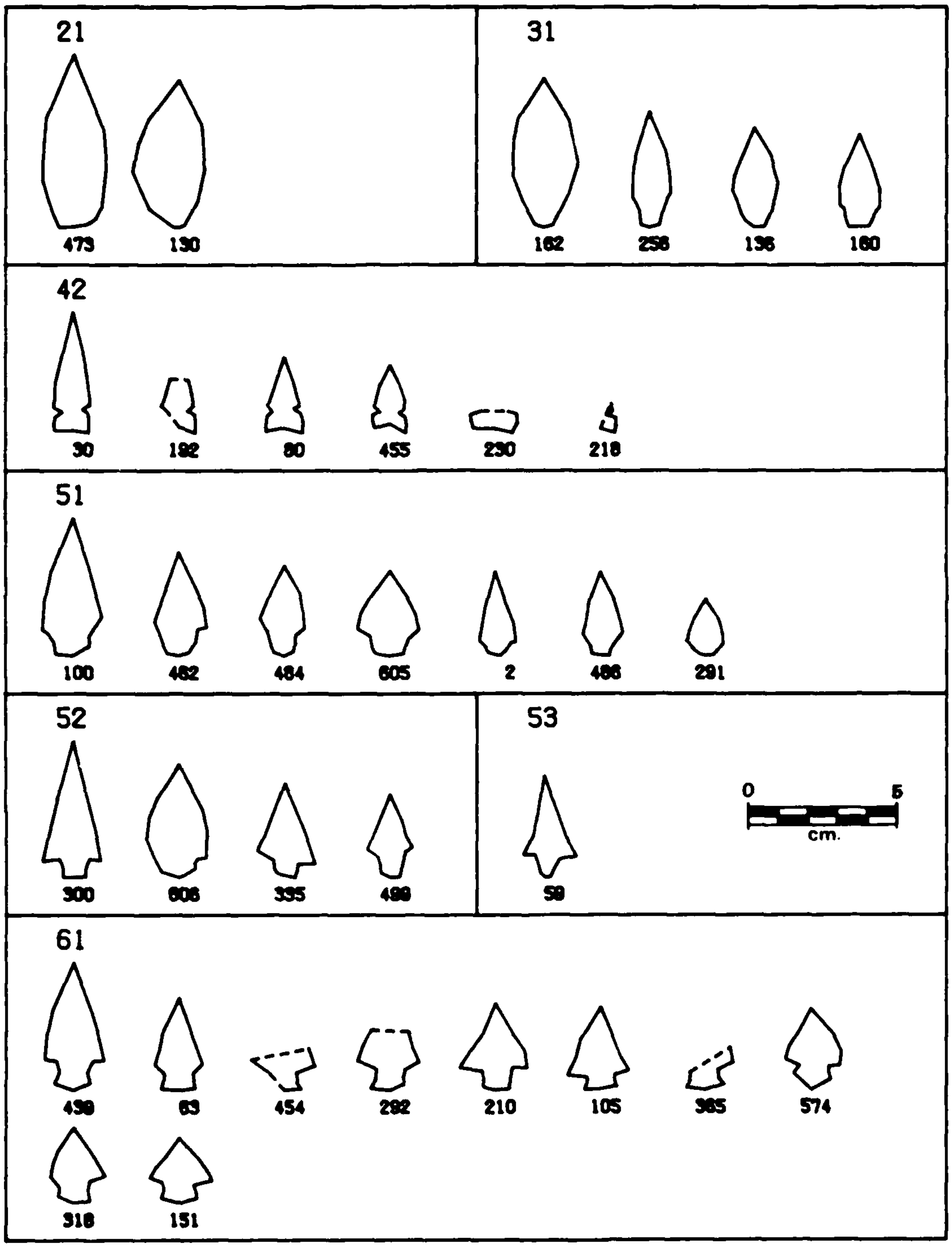

Figure B-1. Projectile point outlines from digitized measurements, 45-DO-242. Upper number is the historic type (see Figure 3-11 for key). Lower number is master number.

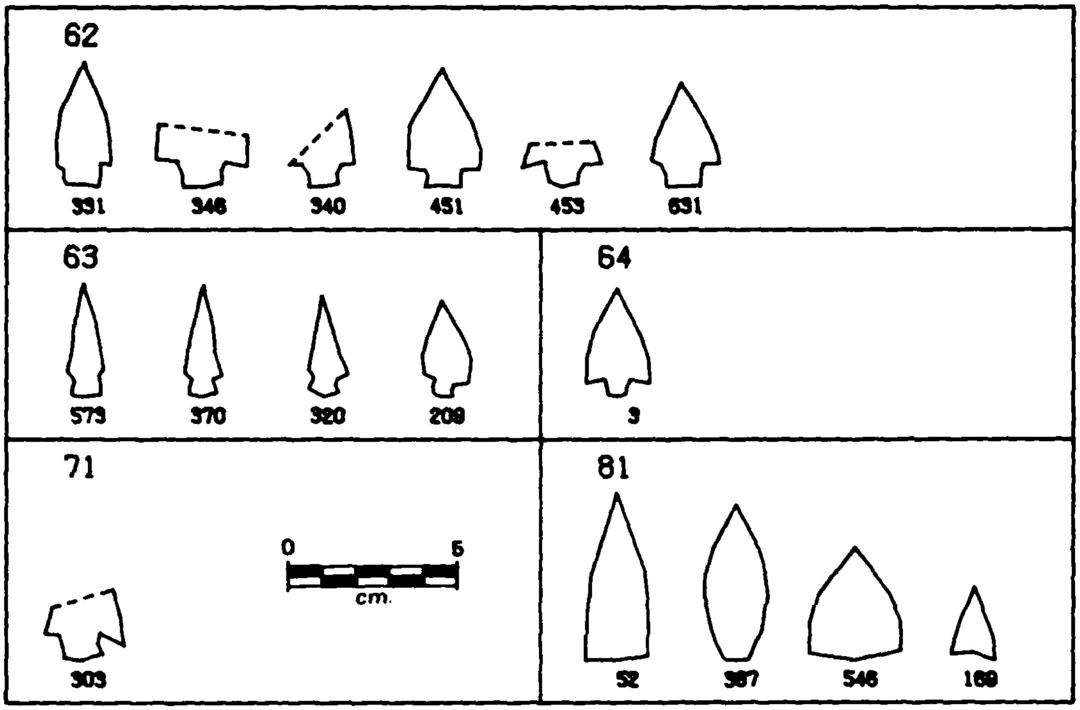

Figure B-1. Cont'd.

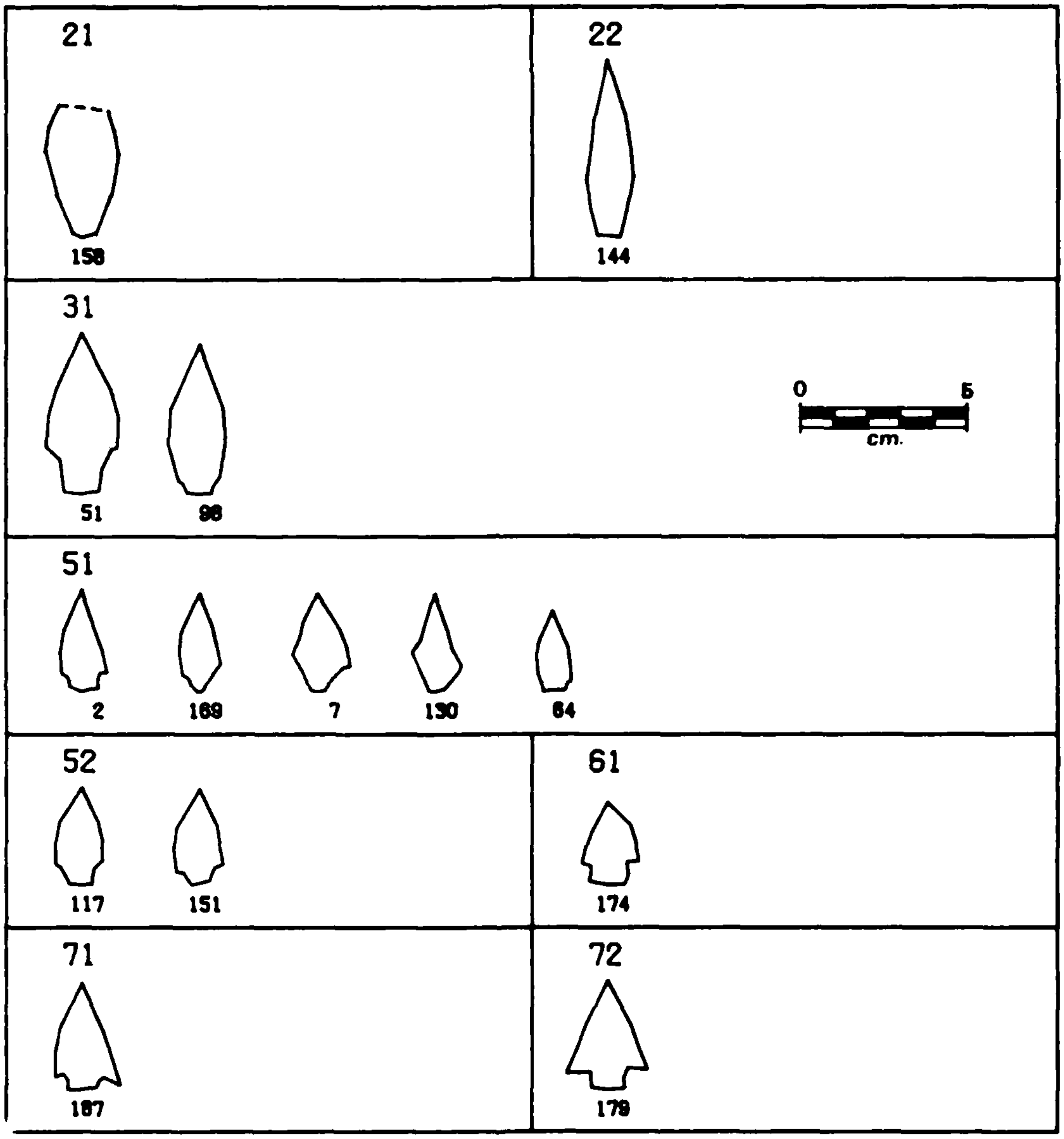

Figure B-2. Projectile point outlines from digitized measurements, 45-DO-243. Upper number is the historic type (see Figure 3-11 for key). Lower number is master number.

APPENDIX C

FAUNAL ASSEMBLAGE

45-DO-242

Family Leporidae

Sylvilagus cf nuttallii

Zone 11: 1 innominate fragment, 1 first phalanx, 1 tibia fragment.

Family Sciuridae

Marmota flaviventris

Zone 12: 1 ulna fragment, 1 femur fragment, 1 calcaneus.

Zone 13: 1 skull fragment, 1 mandible fragment, 1 incisor, 2 premolars, 9 molars, 3 molar fragments, 1 radius fragment, 2 ulna fragments, 1 tibia.

Zone 14: 1 incisor fragment.

Family Geomyidae

Thomomys talpoides

Zone 11: 1 skull fragment, 1 mandible fragment, 1 femur fragment.

Zone 13: 2 skulls, 3 skull fragments, 7 mandibles, 10 mandible fragments, 1 humerus, 4 innominates, 2 innominate fragments, 2 femurs, 1 femur fragment.

Zone 14: 2 skull fragments, 6 molars, 1 axis vertebra, 1 lumbar vertebra, 1 scapula fragment.

Family Heteroymidae

Perognathus parvus

Zone 11: 1 mandible, 2 innominates, 1 tibia.

Zone 12: 2 mandibles.

Zone 13: 1 mandible fragment.

Family Castoridae

Castor canadensis

Zone 12: 1 incisor fragment.

Zone 13: 3 incisor fragments.

Family Cricetidae

Zone 11: 1 femur, 1 tibia.

Peromyscus maniculatus

Zone 13: 1 mandible.

Lagurus curtatus

Zone 11: 3 mandible fragments.

Family Canidae

Canis sp.

Zone 13: 1 femur, 1 tibia, 1 astragalus, 1 calcaneus, 3 tarsals, 4 metatarsal fragments, 1 radius fragment, 1 mandible fragment, 1 molar fragment.

Canis cf. familiaris

Zone 12: 1 mandible fragment, 2 premolar fragments.

Zone 13: 1 mandible, 2 incisors, 4 premolars, 1 molar.

Family Mustelidae

Mustela frenata

Zone 11: 1 mandible fragment.

Family Cervidae

Zone 13: 7 antler fragments.

Odocoileus spp.

Zone 11: 1 incisor, 1 incisor fragment, 7 molar fragments.

Zone 12: 1 incisor, 1 incisor fragment, 1 molar, 7 molar fragments, 1 tibia fragment, 1 astragalus, 2 calcaneus fragments, 1 metapodial fragment.

Zone 13: 12 skull fragments, 33 mandible fragments, 45 incisors, 4 incisor fragments, 25 premolars, 7 premolar fragments, 81 molars, 88 molar fragments, 7 scapula fragments, 1 humerus fragment, 3 radius fragments, 3 carpals, 4 metacarpal fragments, 6 tibia fragments, 5 astragali, 5 calcaneus, 2 calcaneus fragments, 6 tarsals, 3 metatarsal fragments, 1 first phalanx.

Zone 14: 4 molar fragments.

Cervus elaphus

Zone 13: 3 molar fragments, 1 humerus fragment.

Family Antilocapra

Antilocapra americana

Zone 12: 1 astragalus fragment.

Zone 13: 1 radius fragment, 1 innominate fragment.

Ovis canadensis

Zone 11: 1 premolar, 1 molar, 1 molar fragment.

Zone 12: 1 premolar, 1 molar fragment.

Zone 13: 129 horn core fragments, 2 mandible fragments, 3 incisors, 7 premolars, 2 premolar fragments, 7 molars, 23 molar fragments, 1 atlas fragment, 1 scapula fragment, 1 humerus fragment, 1 radius fragment, 1 ulna fragment, 1 carpal, 1 femur fragment, 1 astragalus, 1 astragalus fragment, 1 metatarsal fragment, 4 first phalanx fragments, 3 metapodial fragments.

Zone 14: 1 incisor fragment, 1 molar fragment.

Deer-Sized

Zone 11: 1 mandible fragments, 1 humerus fragment, 1 innominate fragment, 1 femur fragment, 3 metapodial fragments.

Zone 12: 1 mandible fragment, 2 molar fragments, 1 axis vertebra fragments, 1 cervical vertebra fragment, 2 lumbar vertebra fragments, 2 vertebra centrum fragments, 1 rib fragment, 1 scapular fragment, 4 humerus fragments, 4 radius fragments, 3 carpals, 2 carpal fragments, 1 innominate fragment, 5 femur fragments, 6 tibia fragments, 1 astragulus, 1 tarsal fragment, 1 metatarsal fragment, 8 metapodial fragments.

Zone 13: 18 skull fragments, 42 mandible fragments, 6 incisor fragments, 8 molar fragments, 6 atlas vertebra fragments, 4 axis vertebra fragments, 33 cervical vertebra fragments, 19 thoracic vertebra fragments, 46 lumbar vertebra fragments, 2 sacrum fragments, 22 vertebra centrum fragments, 157 rib fragments, 4 sternabrae, 1 costal cartilage fragment,

38 scapula fragments, 32 humerus fragments, 31 radius fragments, 12 ulna fragments, 6 carpals, 2 carpal fragments, 16 metacarpal fragments, 14 innominate fragments, 57 femur fragments, 75 tibia fragments, 16 astragalus fragments, 5 calcaneus, 10 calcaneus fragments, 3 tarsals, 4 tarsal fragments, 11 metatarsal fragments, 2 dewclaw fragments, 7 first phalanx fragments, 1 second phalanx fragment, 108 metapodial fragments, 3 sesamoids, 8 sesamoid fragments.

Zone 14: 1 skull fragment, 2 mandible fragments, 4 rib fragments, 1 costal cartilage fragment, 1 tibia fragment, 1 metatarsal fragment.

Elk-Sized

Zone 13 2 skull fragments, 1 cervical vertebra fragment, 1 lumbar vertebra fragment, 1 rib fragment, 1 scapula fragment, 1 sesamoid fragment.

Family Chelydridae

Chrysemys picta

Zone 11: 1 shell fragment.

Zone 13: 53 shell fragments.

Family Ranidae/Bufonidae

Zone 14: 1 skull fragment, 1 tibia.

Family Salmonidae

Zone 11: 4 vertebra fragments.

Zone 13: 14 vertebrae, 28 vertebra fragments.

Zone 14: 1 vertebra, 7 vertebra fragments.

45-DO-243

Family Sciuridae

Marmota flaviventris

Zone 21: 1 mandible fragment.

Zone 22: 1 incisor fragment, 1 ulna fragment.

Zone 23: 2 mandible fragments, 2 incisor fragments, 1 molar, 1 humerus fragment.

Zone 24: 1 maxilla fragment, 2 incisor fragments, 3 molars, 1 humerus fragment, 1 radius fragment, 1 innominate fragment, 1 astragalus.

Family Geomyidae

Thomomys talpoides

Zone 22: 2 mandibles, 4 mandible fragments, 1 skull, 2 humerus fragments, 2 innominate fragments, 1 femur fragment.

Zone 23: 6 mandibles, 16 mandible fragments, 1 skull, 1 skull fragment, 6 maxilla fragments, 1 scapula, 2 scapula fragments, 4 humeri, 1 humerus fragment, 1 ulna, 1 pelvis, 1 innominate fragment, 2 femurs.

Zone 24: 4 mandibles, 8 mandible fragments, 1 skull, 1 skull fragment, 3 maxilla fragments, 1 scapula, 1 scapula fragments, 1 humerus fragment, 1 ulna, 1 radius, 3 pelves, 1 pelvis fragment, 1 innominate, 3 femurs, 2 femur fragments, 1 tibia, 3 tibia fragments.

Family Heteromyidae

Perognathus parvus

Zone 24: 2 maxilla fragments.

Family Cricetidae

Zone 22: 1 maxilla fragment.

Zone 23: 1 mandible fragment.

Peromyscus maniculatus

Zone 22: 1 maxilla fragment.

Zone 23: 1 mandible fragment.

Family Canidae

Canis spp.

Zone 21: 1 scapula fragment.

Zone 24: 1 premolar, 1 third phalanx fragment.

Family Cervidae

Odocoileus spp.

Zone 21: 1 premolar, 7 molar fragments.

Zone 22: 2 mandible fragments, 3 prelmolars, 1 premolar fragment, 2 molar fragments, 1 scapula fragment, 1 metapodial fragment, 1 first phalanx fragment.

Zone 23: 1 mandible fragment, 4 premolars, 1 molar, molar fragments, 1 astragulus, 1 tibia fragment.

Zone 24: 2 molar fragments.

Family Bovidae

Antilocapra americana

Zone 22: 1 premolar.

Zone 24: 1 third phalanx fragment.

Ovis canadensis

Zone 22: 2 astragali, 1 radius fragment, 1 skull fragment.

Deer-Sized

Zone 22: 3 tibia fragments, 2 astragalus fragments, 1 metatarsal fragment, 1 humerus fragment.

Zone 23: 1 mandible fragment, 1 atlas fragment, 1 rib fragment, 2 scapula fragments, 1 radius fragment, 1 tibia fragment, 1 calcaneus fragment.

Zone 24: 1 scapula fragment, 1 tibia fragment.

Family Chelydridae

Chrysemys picta

Zone 21: 2 shell fragments.

Zone 23: 5 shell fragments.

Family Salmonidae

Zone 21: 2 vertebrae.

Zone 22: 9 vertebra fragments.

Zone 23: 10 vertebra, 11 vertebra fragments.

Zone 24: 1 vertebrae, 3 vertebra fragments.

APPENDIX D:

DESCRIPTION OF CONTENTS OF UNCIRCULATED APPENDICES

Detailed data from two different analyses are available in the form of hard copies of computer files with accompanying coding keys.

Functional analysis data include provenience (site, analytic zone, excavation unit and level, and feature number and level (if applicable); object master number; abbreviated functional object type; and coding that describes each tool on a given object. Data normally are displayed in alphanumeric order by site, analytic zone, functional object type, and master number. Different formats nay be available upon request depending upon research focus.

Faunal analysis data include provenience (site, analytic zone, excavation unit and level, feature number, and level (if applicable); taxonomy (family, genus, species); skeletal element; portion; side; sex; burning/butchering code; quantity; and age. Data normally are displayed in alphanumeric order by site, analytic zone, provenience, taxonomy, etc.

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